

Empirical Bayes Shrinkage  
Estimates of State Supplemental  
Nutrition Assistance Program  
Participation Rates in 2006-2008  
for All Eligible People and the  
Working Poor

Final Report

February 2011

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## CONTENTS

|     |  |    |
|-----|--|----|
|     | EXECUTIVE SUMMARY .....  | xi |
| I   | INTRODUCTION .....   | 1  |
| II  | A STEP-BY-STEP GUIDE TO DERIVING STATE ESTIMATES.....  | 5  |
| III | STATE ESTIMATES OF SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM<br>PARTICIPATION RATES AND NUMBER OF ELIGIBLE PEOPLE FOR<br>2006 TO 2008 FOR ALL ELIGIBLE PEOPLE AND THE WORKING POOR ..... | 15 |
|     | REFERENCES.....  | 25 |
|     | APPENDIX A: THE ESTIMATION PROCEDURE:<br>ADDITIONAL TECHNICAL DETAILS .....  | 27 |

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## TABLES

|        |  |    |
|--------|--|----|
| III.1. | Final Shrinkage Estimates of SNAP Participation Rates.....   | 17 |
| III.2. | Final Shrinkage Estimates of Number of People Eligible for SNAP .....  | 18 |
| III.3. | Approximate 90-Percent Confidence Intervals for Final Shrinkage<br>Estimates for 2006, All Eligible People ..... | 19 |
| III.4. | Approximate 90-Percent Confidence Intervals for Final Shrinkage<br>Estimates for 2007, All Eligible People ..... | 20 |
| III.5. | Approximate 90-Percent Confidence Intervals for Final Shrinkage<br>Estimates for 2008, All Eligible People ..... | 21 |
| III.6. | Approximate 90-Percent Confidence Intervals for Final Shrinkage<br>Estimates for 2006, Working Poor .....        | 22 |
| III.7. | Approximate 90-Percent Confidence Intervals for Final Shrinkage<br>Estimates for 2007, Working Poor .....        | 23 |
| III.8. | Approximate 90-Percent Confidence Intervals for Final Shrinkage<br>Estimates for 2008, Working Poor .....        | 24 |
| A.1.   | Direct Sample Estimates of SNAP Participation Rates .....  | 47 |
| A.2.   | Standard Errors of Direct Sample Estimates of SNAP<br>Participation Rates .....                                  | 48 |
| A.3.   | Number of People Receiving SNAP Benefits, Monthly Average .....  | 49 |
| A.4.   | Population on July 1 .....   | 50 |
| A.5.   | Percentage of Participants Who Are Income Eligible and Correctly<br>Receiving Benefits .....                     | 51 |
| A.6.   | Direct Sample Estimates of Percentage of People Eligible for SNAP .....  | 52 |
| A.7.   | Percentage of SNAP Participants in Households with Earners, by<br>Indicator of Earnings, 2008 .....              | 53 |
| A.8.   | Definitions and Data Sources for Predictors .....  | 54 |
| A.9.   | Values for Temporally Constant Predictors .....  | 55 |
| A.10.  | Values for Temporally Variable Predictors .....  | 56 |
| A.11.  | Regression Estimates of SNAP Participation Rates .....   | 57 |
| A.12.  | Standard Errors of Regression Estimates of SNAP Participation Rates ....   | 58 |

|       |  |    |
|-------|--|----|
| A.13. | Preliminary Shrinkage Estimates of SNAP Participation Rates.....   | 59 |
| A.14. | Final Shrinkage Estimates of SNAP Participation Rates.....   | 60 |
| A.15. | Standard Errors of Final Shrinkage Estimates of SNAP<br>Participation Rates.....   | 61 |
| A.16. | Final Shrinkage Estimates of Number of People Eligible for SNAP .....  | 62 |
| A.17. | Final Shrinkage Estimates of Number of Working Poor<br>Eligible for SNAP.....  | 63 |
| A.18. | Standard Errors of Final Shrinkage Estimates of Number of People<br>Eligible for SNAP.....   | 64 |
| A.19. | Standard Errors of Final Shrinkage Estimates of Number of<br>Working Poor Eligible for SNAP .....                                  | 65 |
| A.20. | Number of People Receiving SNAP Benefits under Normal<br>Eligibility Rules, Adjusted for Payment Error, Monthly Average.....       | 66 |
| A.21. | Number of Working Poor Receiving SNAP Benefits under Normal<br>Eligibility Rules, Adjusted for Payment Error, Monthly Average..... | 67 |



## FIGURES

|      |  |    |
|------|--|----|
| I.1  | The Estimation Procedure .....                     | 5  |
| II.1 | An Illustrative Regression Estimator.....          | 8  |
| II.3 | Shrinkage Estimation.....                          | 12 |
| A.1  | Algorithm to Identify Working Poor Households..... | 32 |

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## EXECUTIVE SUMMARY

The Supplemental Nutrition Assistance Program (SNAP) is a central component of American policy to alleviate hunger and poverty. The program's main purpose is "to permit low-income households to obtain a more nutritious diet . . . by increasing their purchasing power" (Food and Nutrition Act of 2008). SNAP is the largest of the domestic food and nutrition assistance programs administered by the U.S. Department of Agriculture's Food and Nutrition Service. During fiscal year 2010, the program served 40 million people in an average month at a total annual cost of almost \$65 billion in benefits. The average monthly program benefit was about \$290 per household.

This report presents estimates that, for each state, measure the need for SNAP and the program's effectiveness in each of the three years from 2006 to 2008. The estimated numbers of people eligible for SNAP measure the need for the program. The estimated SNAP participation rates measure, state by state, the program's performance in reaching its target population. In addition to the participation rates that pertain to all eligible people, we derived estimates of participation rates for the "working poor," that is, people who were eligible for SNAP and lived in households in which someone earned income from a job.

The estimates for all eligible people and for the working poor were derived jointly using empirical Bayes shrinkage estimation methods and data from the Current Population Survey, the American Community Survey, and administrative records. The shrinkage estimator that was used averaged sample estimates of participation rates in each state with predictions from a regression model. The predictions were based on observed indicators of socioeconomic conditions in the states, such as the percentage of the total state population receiving SNAP benefits. The shrinkage estimates derived are substantially more precise than direct sample estimates from the Current Population Survey or the Survey of Income and Program Participation, the best sources of current data on household incomes used to model program eligibility. Shrinkage estimators improve precision by "borrowing strength," that is, by using data for multiple years from all the states to derive each state's estimates for a given year and by using not only sample survey data but also census and administrative data. This report describes our shrinkage estimator in detail.

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## I. INTRODUCTION

This report presents estimates of the Supplemental Nutrition Assistance Program (SNAP) participation rate and the number of people eligible for SNAP in each state for the years 2006 to 2008.<sup>1</sup> It also presents estimates of the participation rates for the working poor and the numbers of eligible working poor, where we define as “working poor” any person who was eligible for SNAP and lived in a household in which a member earned income from a job. These estimates were derived using “shrinkage” estimation methods. This introductory chapter overviews the advantages and some previous applications of shrinkage estimation. Chapter II describes how we derived shrinkage estimates, and Chapter III presents our state estimates for all eligible people and for the working poor. Technical details and additional information about our estimation methods are provided in Appendix A.

The principal challenge in deriving state estimates like those presented in this report is that two leading national surveys collecting current income data for families and used for estimating program eligibility—the Current Population Survey (CPS) and the Survey of Income and Program Participation (SIPP)—have small samples for most states. Thus, “direct” estimates—estimates based on data from one source for the state and time period in question—from these surveys are imprecise. For example, to calculate a direct estimate of Louisiana’s 2008 SNAP participation rate, we use just 2008 data on households in the CPS from Louisiana. Because of the potential errors introduced by the CPS surveying only a small number of families in Louisiana rather than all families in the state, though, we can be confident—by a commonly used standard—only that Louisiana’s SNAP participation rate in 2008 was between about 58 and 74 percent. This range is wide (but typical), reflecting our substantial uncertainty about what Louisiana’s participation rate actually was.

---

<sup>1</sup> The estimates presented here are also reported and compared with one another in Cunyningham and Castner (2010).

To improve precision, statisticians have developed “indirect” estimators. These estimators “borrow strength” by using data from other states, time periods, or data sources. The assumption underlying indirect estimation is that what happened in other states in 2008 or what happened in Louisiana (and other states) in other years is relevant to estimating what happened in Louisiana in 2008. Using indirect estimation, the Census Bureau improved the precision of state poverty rates derived from the CPS by calculating two- and three-year averages (DeNavas-Walt et al. 2006).

A generally superior indirect estimator is the “shrinkage” estimator. A shrinkage estimator averages estimates obtained from different methods. For example, Fay and Herriott (1979) developed a shrinkage estimator that combined direct sample and regression estimates of per capita income for small places (population less than 1,000). Their estimates were used to allocate funds under the General Revenue Sharing Program. Shrinkage estimators have also been used to develop state estimates of income-eligible infants and children for allocating funds under the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (Schirm 2000). To borrow strength across both space (states) and time, the current WIC eligibles estimator uses several years of CPS data and combines direct sample estimates with predictions from a regression model. The predictions of WIC eligibles are based on, for example, state poverty rates for children according to tax return data and median household income according to Census 2000. States with similar socioeconomic conditions, as reflected in these poverty rate and income statistics, are observed (and predicted) to have similar proportions of infants and children eligible for WIC. The shrinkage estimator uses data for all the states (with data for prior years and data from other sources) to estimate a regression model and formulate a prediction for Louisiana. Then, the shrinkage estimator optimally averages the direct sample and regression estimates for Louisiana to obtain a shrinkage estimate. This contrasts with the direct estimator that ignores systematic patterns across states, using, for example, only Louisiana’s data to derive an estimate for Louisiana, even though conditions may be similar in Arkansas or Oklahoma. In another application of shrinkage methods,

shrinkage estimates of poor school-aged children by state and county were used in allocating Title I compensatory education funds for disadvantaged youth (National Research Council 2000).

In these and other applications of shrinkage estimation, the gain in precision from borrowing strength via a shrinkage estimator can be substantial. For example, the confidence intervals for the shrinkage estimates of WIC eligibles in 1992 were, on average, 61 percent narrower than the corresponding confidence intervals for the direct estimates (Schirm 1995). To obtain that same gain in precision with a direct estimator would require—according to rough calculations—more than a six-fold increase in sample size. Therefore, we use an indirect estimator and borrow strength to derive state estimates of SNAP participation rates and counts of all eligible people and the eligible working poor (while recognizing that the gain in precision might not be as large as for the 1992 WIC estimates).

The shrinkage estimator we used combined direct sample and regression estimates and borrowed strength across states, over time, and between groups (all eligible people and the working poor). Like the estimators used in the other applications described in this chapter, our estimator also borrowed strength by using data

#### U.S. Census Bureau Data

The **Current Population Survey (CPS)** is conducted monthly by the U.S. Census Bureau for the Bureau of Labor Statistics, and is the primary source of current information on the labor force characteristics of the U.S. population. The CPS Annual Social and Economic (ASEC) Supplement includes additional data on work experience, income, and noncash benefits, and has a sample size of close to 100,000 households.

The **American Community Survey (ACS)** is conducted monthly by the U.S. Census Bureau in every county, American Indian and Alaska Native Area, Hawaiian Home Land, and Puerto Rico. Designed to replace the decennial census long-form, it collects economic, social, demographic, and housing information on about three million households annually.

**Population Estimates** are published each year by the U.S. Census Bureau's Population Division. The estimates are developed using decennial census population estimates and administrative records and other data on births, deaths, net domestic migration, and net international migration.

More information on these data sources is available at <http://www.census.gov>.

from outside the main sample survey (the CPS), specifically, data from administrative records systems and the ACS. In all, our estimator used three-year averages of ACS data, and three years of

CPS data, SNAP administrative data, population estimates, and tax return data for all states to obtain estimates for each state in each year (2006 to 2008) for all eligible people and for the working poor.

The shrinkage estimates derived for any one application are not guaranteed to be more accurate than estimates obtained using some other method. They have good statistical properties in general, however, and we have found for our specific application that as in previous applications, shrinkage estimation can greatly improve precision. Additional support for shrinkage estimators is provided by the findings from simulation studies. For example, in a comprehensive evaluation of the relative accuracy of alternative estimators of state poverty rates, Schirm (1994) found that shrinkage estimates are substantially more accurate than direct estimates or indirect estimates obtained from other methods that have been widely used.



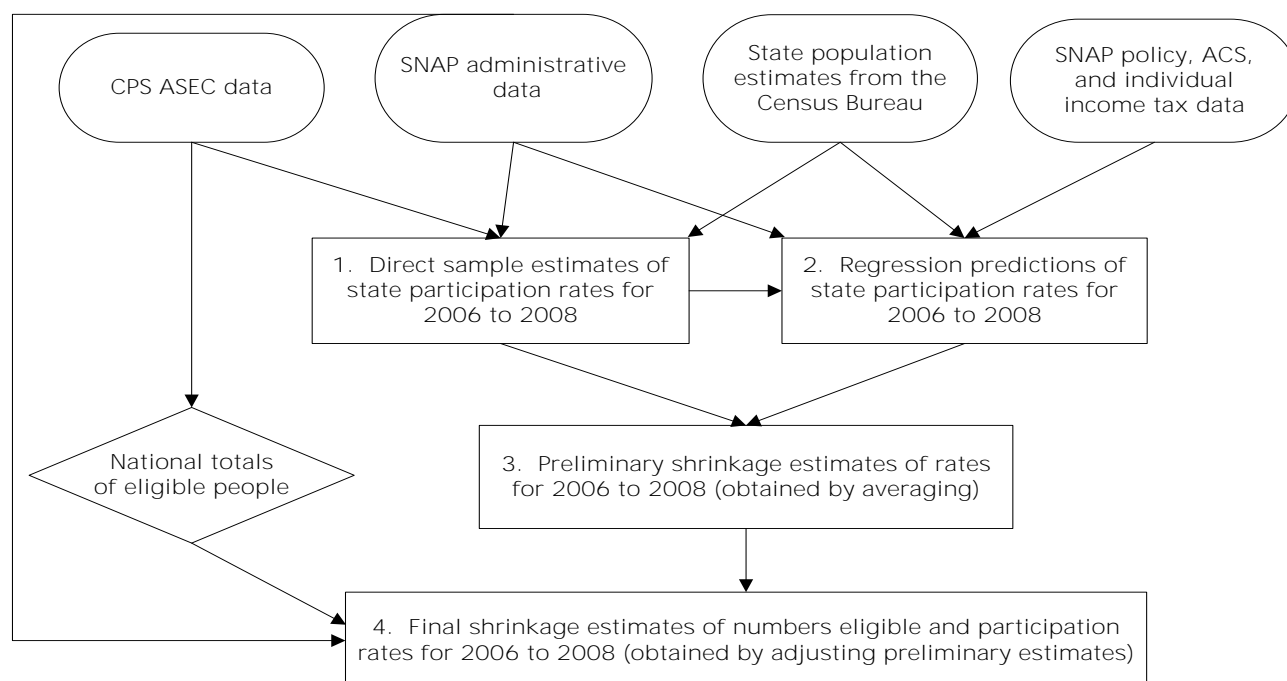
## II. A STEP-BY-STEP GUIDE TO DERIVING STATE ESTIMATES

This chapter describes our procedure for estimating state SNAP participation rates for all eligible people and the working poor and the numbers of people eligible for SNAP benefits for 2006 to 2008. This procedure, summarized by the flow chart in Figure II.1, has the following four steps:

1. From CPS Annual Social and Economic Supplement (ASEC) data and SNAP administrative data, derive direct sample estimates of state SNAP participation rates for each of the three years 2006 to 2008.
2. Using a regression model, predict state SNAP participation rates based on administrative and ACS data.
3. Using “shrinkage” methods, average the direct sample estimates and regression predictions to obtain preliminary shrinkage estimates of state SNAP participation rates.
4. Adjust the preliminary shrinkage estimates to obtain final shrinkage estimates of state SNAP participation rates.

Each step is described in the remainder of this chapter. Additional technical details are provided in Appendix A.

Figure II.1. The Estimation Procedure



## **1. From CPS Data and SNAP Administrative Data, Derive Direct Sample Estimates of State SNAP Participation Rates for Each of the Three Years 2006 to 2008**

A SNAP participation rate is obtained by dividing an estimate of the number of people participating in SNAP by an estimate of the number of people eligible for SNAP, with the resulting ratio expressed as a percentage. We used SNAP administrative data to estimate numbers of participants in an average month in the fiscal year and we used CPS data to estimate numbers of eligibles in an average month. Because the CPS collects family income data for the prior calendar year, we obtained estimates of eligibles in 2008, for example, from the 2009 CPS ASEC. To derive a participation rate for the working poor, we divided the number of working poor participants by the number of working poor people who were eligible.

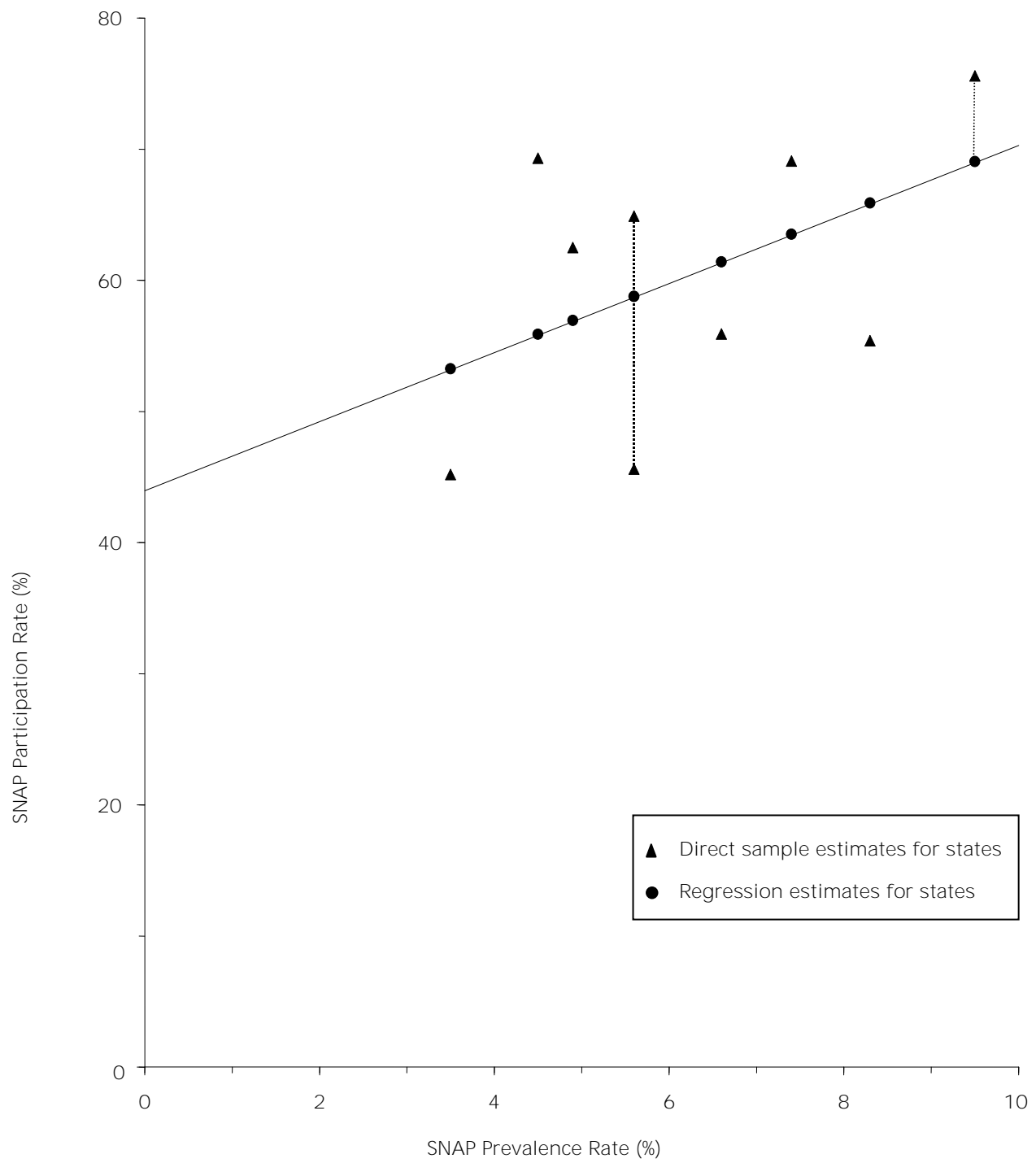
As noted in Chapter I, direct sample estimates of participation rates are relatively imprecise. The standard errors for the estimates, reported in Appendix A along with the estimated rates, tend to be large, so our uncertainty about states' true rates is great. For example, according to commonly used statistical standards, we can be confident only that Louisiana's participation rate for all eligible people in 2008 was between 58 percent and 74 percent. This range is so wide and our uncertainty so great because the CPS sample for Louisiana is small. This lack of data, that is, the small number of sample observations that pertain directly to the target geographic area and time period—Louisiana and 2008 in our example—is the fundamental problem of “small area estimation.”

## **2. Using a Regression Model, Predict State SNAP Participation Rates Based on Administrative and ACS Data**

Though the direct estimate can be “design” unbiased, the main limitation of the sample estimates derived in the previous step is imprecision or unstable variance estimates. On the other hand, regression estimates are predictions based on nonsample or highly precise sample data, such as the ACS and administrative records data. The latter include records from government tax and transfer programs.

Figure II.2 illustrates how the regression estimator works. The simple example in the figure has only nine states and data for just one year on one predictor—the SNAP “prevalence” rate—that will be used to predict each state’s SNAP participation rate for eligible people. The SNAP prevalence rate is measured by the percentage of all people (eligible and ineligible combined) who received SNAP benefits, in contrast to the SNAP participation rate, which is measured by the percentage of eligible people who received SNAP benefits. The triangles in the figure correspond to direct sample estimates; a triangle shows the prevalence rate in a state (read off the horizontal axis) and the sample estimate of the participation rate in that state (read off the vertical axis). Not surprisingly, the graph suggests that prevalence and participation rates are systematically associated. States with higher percentages of all people participating in the program tend to have higher percentages of eligible people participating, although the relationship is far from perfect. To measure this relationship between prevalence and participation rates and derive predictions, we can use a technique called “least squares regression” to draw a line through the triangles (that is, we “regress” the sample estimates on the predictor). Regression estimates of participation rates are points on that line, the circles in Figure II.2. The predicted participation rate for a particular state is obtained by moving up or down from the state’s direct sample estimate (the triangle) to the regression line (where there is a circle) and reading the value off the vertical axis. For example, the regression estimator predicts a participation rate of just under 60 percent for both states with prevalence rates of about 5.5 percent. In contrast, for the state with about 9.5 percent of people receiving SNAP benefits, the predicted participation rate is nearly 70 percent.

Figure II.1. An Illustrative Regression Estimator



To derive the regression estimates for 2006 to 2008 and for all eligible people and the working poor, we included all of the states, not just nine as in our illustrative example, and we used seven predictors, not just one. Adding six predictors improves our predictions. The seven predictors used measure:

- the percentage of the population income-eligible for SNAP and correctly receiving SNAP benefits, obtained from administrative data and population estimates
- the elderly combined poverty rate according to individual income tax data and population estimates, namely, the percentage of elderly individuals who were not claimed on tax returns or were claimed on tax returns with adjusted gross income below the poverty level
- the percentage of households with a female householder, no husband present, and related children under 18 years according to 2006-2008 ACS three-year estimates
- the percentage of occupied housing units that were owner-occupied according to 2006-2008 ACS three-year estimates
- the percentage of renter-occupied housing units spending 30 percent or more of household income on rent and utilities according to 2006-2008 ACS three-year estimates
- the percentage of individuals 25 years and over who have completed a bachelor's degree according to 2006-2008 ACS three-year estimates
- the percentage of children under the federal poverty level according to 2006-2008 ACS three-year estimates

These seven predictors were selected as the best from a longer list described in Appendix A, which provides complete definitions and sources for the predictors. Appendix A also presents the regression estimates and their standard errors. The standard errors tend to be fairly equal across the states and much smaller than the largest standard errors for direct sample estimates, reflecting substantial gains in precision from regression for the states with the most error-prone direct sample estimates.

Comparing how the direct sample and regression estimators use data reveals how the regression estimator “borrows strength” to improve precision. When we derived direct sample estimates in Step 1, we used only one year’s CPS sample data from Louisiana to estimate Louisiana’s participation rate in that year, even though Louisiana, like nearly all states, has a small CPS sample. Deriving regression estimates in this step, we estimated a regression line from sample,

administrative, and ACS data for multiple years and all the states and used the estimated line (with administrative and ACS data for Louisiana) to predict Louisiana’s participation rate in a given year. In other words, the regression estimator not only uses the sample estimates from every state for multiple years to develop a regression estimate for a single state in a single year but also incorporates data from outside the sample, namely, data in administrative records systems and the ACS. To improve precision even further, the estimator borrows strength across groups—all eligible people and the working poor—by deriving estimates for the groups jointly.

The regression estimator improves precision by using more data. It uses that additional data to identify states with direct sample estimates that seem too high or too low because of sampling error, that is, error from drawing a sample—a subset of the population—that has a higher or lower participation rate than the entire state population has. For example, suppose a state has a low SNAP prevalence rate and values for other predictors that are consistent with a low SNAP participation rate. Then, our regression estimator would predict a low participation rate for that state, implying that a direct sample estimate showing a high rate is too high. The regression estimate will be lower than the direct sample estimate for such a state. On the other hand, if the sample data for a state show a much lower participation rate than expected in light of the SNAP prevalence rate and the other predictors, the regression estimate for that state will be higher than the sample estimate.<sup>2</sup>

### **3. Using “Shrinkage” Methods, Average the Direct Sample Estimates and Regression Predictions to Obtain Preliminary Shrinkage Estimates of State SNAP Participation Rates**

As noted before, the limitation of the direct sample estimator is imprecision. The limitation of the regression estimator is called “bias.” Some states really have higher or lower participation rates

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<sup>2</sup> Note that the regression estimator is also subject to error such as modeling error since the estimate will depend on the goodness-of-fit of the regression model.

than we expect (and predict with the regression estimator) based on the SNAP prevalence rate and other predictors used. Such errors in regression estimates reflect bias.

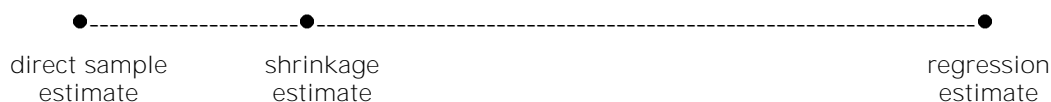
These limitations arise for the following reasons. The direct sample estimator uses relatively little information. It uses only the typically small number of sample observations for one state and one year to obtain an estimate for that state and year. It does not use sample data for other states or other years or data from other sources, such as administrative records or the ACS. Although the regression estimator borrows strength, using data from all the states and multiple years as well as administrative and ACS data, it makes no further use of the sample data after estimating the regression line. It treats the entire difference between the sample and regression estimates as sampling error, that is, error in the direct sample estimate. No allowance is made for prediction error, that is, error in the regression estimate. Although not all, if any, true state participation rates lie on the regression line, the assumption underlying the regression estimator is that they do.

Using all of the information at hand, a shrinkage estimator addresses the limitations of the direct sample and regression estimators by combining the sample and regression estimates, striking a compromise. As illustrated in Figure II.3, a shrinkage estimator takes a weighted average of the sample and regression estimates, weighting them according to their relative accuracy. We calculated weights using the empirical Bayes methods described in Appendix A. Generally, the more precise the direct sample estimate for a state, the closer the shrinkage estimate will be to it. The larger samples drawn in large states support more precise direct sample estimates, so shrinkage estimates tend to be closer to the direct sample estimates for large states. Given the precision of the direct sample estimate for a state, the weight given to the regression estimate depends on how well the regression line “fits.” If we find good predictors reflecting why some states have higher participation rates than other states, we say that the regression line “fits well.” The shrinkage estimate will be closer to the regression estimate and farther from the direct sample estimate when the regression line fits well than when the line fits poorly. Striking a compromise between the direct sample and

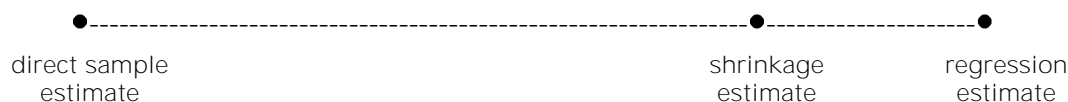
regression estimators, the shrinkage estimator strikes a compromise between imprecision and bias. The direct sample and regression estimates are optimally weighted to improve accuracy by minimizing a measure of error that reflects both imprecision and bias. By accepting a little bias, the shrinkage estimator may be substantially more precise than the direct sample estimator. By sacrificing a little precision, the shrinkage estimator may be substantially less biased than the regression estimator. The shrinkage estimator optimizes the tradeoff between imprecision and bias.

Figure II.3. Shrinkage Estimation

Poor predictions or state with relatively large sample  $\Rightarrow$  more weight on direct sample estimate:



Good predictions or state with relatively small sample  $\Rightarrow$  more weight on regression estimate:



In the next step of our estimation procedure, we make some fairly small adjustments to the shrinkage estimates that we derive in this step. Thus, we call the estimates from this step “preliminary” and the estimates from the next step “final.”

#### 4. Adjust the Preliminary Shrinkage Estimates to Obtain Final Shrinkage Estimates of State SNAP Participation Rates

We adjusted the preliminary shrinkage estimates of participation rates so that the eligibles counts implied by the rates sum to the national eligibles count estimated directly from the CPS. This adjustment was carried out separately for each year and for the two groups of eligible people (all eligible people and the working poor). The following description of the adjustments will focus on the 2008 estimates for all eligible people. In Appendix A, we describe the results of the adjustments for other years and for the working poor and discuss our adjustment method in more detail.



To implement the adjustment, we calculated preliminary estimates of eligibles counts from the preliminary estimates of participation rates derived in Step 3 and the administrative estimates of the numbers of SNAP participants obtained in Step 1. The state eligibles counts summed to 41,704,201 for 2008, while the national total for 2008 estimated directly from the CPS was 41,055,094. To obtain estimated eligibles counts for states that sum (aside from rounding error) to the direct estimate of the national total, we multiplied each of the preliminary eligibles counts by  $41,055,094 \div 41,704,201$  ( $\approx 0.9844$ ). Such benchmarking of estimates for smaller areas to a relatively precise estimated total for a larger area is common practice.

Applying this adjustment, we obtained our final shrinkage estimates of the numbers of people eligible for SNAP. From those estimates and our administrative estimates of the numbers of SNAP participants, we derived final shrinkage estimates of participation rates. Our final shrinkage estimates are presented in the next chapter.

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### III. STATE ESTIMATES OF SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM PARTICIPATION RATES AND NUMBER OF ELIGIBLE PEOPLE FOR 2006 TO 2008 FOR ALL ELIGIBLE PEOPLE AND THE WORKING POOR

Tables III.1 and III.2 present our final shrinkage estimates of SNAP participation rates and the number of people eligible, respectively, in each state for 2006 to 2008 for all eligible people and for the working poor. These shrinkage estimates are relatively precise; they have much smaller standard errors and narrower confidence intervals than the CPS direct sample estimates. Tables III.3 to III.8 display approximate 90-percent confidence intervals showing the uncertainty remaining after using shrinkage estimation to derive the estimates in Tables III.1 and III.2. One interpretation of a 90-percent confidence interval is that there is a 90-percent chance that the true value—that is, the true participation rate or the true number of eligible people—falls within the estimated bounds. For example, while our best estimate is that Louisiana’s participation rate for all eligible people was 72 percent in 2008 (see Table III.1), the true rate may have been higher or lower. However, according to Table III.5, the chances are 90 in 100 that the true rate was between 68 and 76 percent, an interval that is slightly less than 50 percent as wide as the interval (58 to 74 percent, as cited in Chapter I) around the direct sample estimate. A narrower interval means that we are less uncertain about the true value. According to our calculations, a shrinkage confidence interval for a participation rate is, on average, only about 51 percent as wide as the corresponding sample confidence interval. Thus, shrinkage substantially improves precision and reduces our uncertainty.

Despite the impressive gains in precision, however, substantial uncertainty about the true participation rates for some states remains even after the application of shrinkage methods. Nevertheless, as discussed in Cunyningham and Castner (2010), the shrinkage estimates are sufficiently precise to show, for example, whether a state’s SNAP participation rate was probably near the top, near the bottom, or in the middle of the distribution of rates in a given year. That is enough information for many important purposes, such as guiding an initiative to improve program performance.

Final shrinkage estimates for 2006 and 2007 presented in this report differ slightly from the estimates presented in Cunyningham and Castner (2009) and Cunyningham et al (2010). There are several causes for the differences—two related to the annual data update and two methodological updates specific to the 2008 estimates.

- **The shrinkage estimates use data from three years to estimate participation rates for each year.** Annually, data for the most recent year is added and data for the oldest year is dropped. As a result, the estimates for 2006 and 2007 presented in this report are based on 2006 to 2008 data while the corresponding estimates published in Cunyningham et al (2010) are based on 2005 to 2007 data.
- **The shrinkage estimates incorporate a regression model that is updated each year.** Each year we choose a regression model that best predicts participation rates for all three years and both groups (all eligibles and eligible working poor.) While we place a premium on maintaining consistency in regression predictors from year to year, differences between the 2005 data (used in the previous estimates) and 2008 data (used in the current estimates) resulted in the use of a slightly different regression model. Different regression models lead to slight differences in predicted participation rates, which in turn lead to slight differences in estimated participation rates.
- **For the estimates presented in this report, we used corrected data for the number of SNAP participants in Missouri.** This change primarily affected Missouri's estimated participation rates. However, because, as discussed earlier, data from all states is used to estimate rates for each state, the estimated rates for all states were potentially affected.
- **For the estimates presented in this report, we updated the methodology used to calculate standard errors of eligibles.** The revised methodology uses information recently made available by the Census Bureau and is the methodology recommended by the Bureau. We assessed the effect of this change on the 2007 participation rate estimates, and found no effect or a minimal effect on most states. Estimated participation rates for a handful of smaller states dropped by several percentage points.

Table III.1. Final Shrinkage Estimates of SNAP Participation Rates

|                      | Final Shrinkage Estimates of SNAP Participation Rates (Percent) |      |      |              |      |      |
|----------------------|---|------|------|--------------|------|------|
|                      | All Eligible People   |      |      | Working Poor |      |      |
|                      | 2006  | 2007 | 2008 | 2006         | 2007 | 2008 |
| Alabama              | 67  | 66   | 67   | 60           | 62   | 60   |
| Alaska               | 74  | 74   | 70   | 69           | 62   | 69   |
| Arizona              | 61  | 60   | 61   | 56           | 55   | 54   |
| Arkansas             | 75  | 75   | 71   | 69           | 69   | 64   |
| California           | 50  | 49   | 50   | 35           | 34   | 31   |
| Colorado             | 57  | 55   | 52   | 46           | 45   | 41   |
| Connecticut          | 70  | 66   | 66   | 52           | 51   | 50   |
| Delaware             | 72  | 69   | 66   | 69           | 58   | 62   |
| District of Columbia | 84  | 80   | 86   | 40           | 39   | 41   |
| Florida              | 59  | 57   | 62   | 49           | 48   | 48   |
| Georgia              | 67  | 62   | 64   | 56           | 52   | 53   |
| Hawaii               | 76  | 75   | 78   | 58           | 58   | 58   |
| Idaho                | 53  | 50   | 55   | 51           | 52   | 52   |
| Illinois             | 80  | 81   | 80   | 68           | 67   | 66   |
| Indiana              | 72  | 71   | 69   | 71           | 67   | 68   |
| Iowa                 | 70  | 75   | 75   | 66           | 70   | 72   |
| Kansas               | 59  | 58   | 57   | 49           | 49   | 48   |
| Kentucky             | 79  | 83   | 86   | 71           | 79   | 77   |
| Louisiana            | 80  | 77   | 72   | 74           | 69   | 66   |
| Maine                | 89  | 89   | 94   | 81           | 86   | 85   |
| Maryland             | 64  | 59   | 61   | 48           | 44   | 46   |
| Massachusetts        | 66  | 64   | 70   | 42           | 47   | 46   |
| Michigan             | 84  | 91   | 86   | 84           | 84   | 83   |
| Minnesota            | 64  | 64   | 62   | 52           | 53   | 51   |
| Mississippi          | 63  | 66   | 64   | 59           | 58   | 60   |
| Missouri             | 85  | 84   | 83   | 77           | 76   | 75   |
| Montana              | 63  | 65   | 65   | 60           | 64   | 63   |
| Nebraska             | 62  | 63   | 63   | 54           | 58   | 57   |
| Nevada               | 53  | 51   | 51   | 46           | 37   | 41   |
| New Hampshire        | 62  | 60   | 62   | 49           | 53   | 50   |
| New Jersey           | 57  | 54   | 54   | 43           | 44   | 41   |
| New Mexico           | 74  | 70   | 66   | 71           | 64   | 64   |
| New York             | 64  | 61   | 68   | 46           | 49   | 48   |
| North Carolina       | 64  | 64   | 65   | 57           | 57   | 57   |
| North Dakota         | 57  | 62   | 67   | 51           | 59   | 62   |
| Ohio                 | 70  | 69   | 70   | 65           | 61   | 64   |
| Oklahoma             | 72  | 70   | 68   | 65           | 63   | 61   |
| Oregon               | 89  | 92   | 92   | 77           | 80   | 78   |
| Pennsylvania         | 71  | 72   | 74   | 62           | 67   | 65   |
| Rhode Island         | 56  | 56   | 61   | 35           | 40   | 40   |
| South Carolina       | 75  | 74   | 75   | 66           | 63   | 66   |
| South Dakota         | 58  | 61   | 61   | 56           | 58   | 62   |
| Tennessee            | 86  | 86   | 87   | 72           | 75   | 73   |
| Texas                | 63  | 56   | 55   | 54           | 47   | 47   |
| Utah                 | 58  | 53   | 55   | 49           | 50   | 48   |
| Vermont              | 73  | 73   | 79   | 59           | 66   | 65   |
| Virginia             | 64  | 62   | 63   | 50           | 52   | 51   |
| Washington           | 80  | 79   | 80   | 66           | 63   | 65   |
| West Virginia        | 80  | 87   | 91   | 80           | 95   | 91   |
| Wisconsin            | 60  | 63   | 63   | 57           | 60   | 60   |
| Wyoming              | 48  | 45   | 46   | 47           | 47   | 50   |
| United States        | 67  | 65   | 66   | 56           | 55   | 54   |

Table III.2. Final Shrinkage Estimates of Number of People Eligible for SNAP

|                      | Final Shrinkage Estimates of Number of People Eligible for SNAP (Thousands) |        |        |              |        |        |
|----------------------|---|--------|--------|--------------|--------|--------|
|                      | All Eligible People   |        |        | Working Poor |        |        |
|                      | 2006  | 2007   | 2008   | 2006         | 2007   | 2008   |
| Alabama              | 792   | 806    | 844    | 331          | 351    | 362    |
| Alaska               | 74  | 74     | 78     | 36           | 39     | 38     |
| Arizona              | 855   | 890    | 962    | 470          | 435    | 513    |
| Arkansas             | 495   | 492    | 523    | 231          | 234    | 245    |
| California           | 3,933   | 4,146  | 4,374  | 2,225        | 2,428  | 2,610  |
| Colorado             | 431   | 450    | 479    | 192          | 230    | 250    |
| Connecticut          | 292   | 307    | 327    | 111          | 121    | 129    |
| Delaware             | 82  | 88     | 102    | 39           | 42     | 50     |
| District of Columbia | 101   | 104    | 101    | 32           | 32     | 28     |
| Florida              | 1,994   | 2,108  | 2,333  | 904          | 933    | 995    |
| Georgia              | 1,359   | 1,473  | 1,570  | 731          | 825    | 856    |
| Hawaii               | 114   | 118    | 122    | 62           | 67     | 68     |
| Idaho                | 168   | 169    | 180    | 91           | 88     | 101    |
| Illinois             | 1,491   | 1,513  | 1,612  | 682          | 680    | 751    |
| Indiana              | 784   | 799    | 871    | 339          | 372    | 353    |
| Iowa                 | 312   | 310    | 325    | 156          | 169    | 160    |
| Kansas               | 302   | 309    | 320    | 170          | 173    | 179    |
| Kentucky             | 724   | 709    | 717    | 300          | 270    | 230    |
| Louisiana            | 784   | 820    | 890    | 361          | 404    | 405    |
| Maine                | 167   | 165    | 167    | 70           | 64     | 68     |
| Maryland             | 448   | 497    | 551    | 213          | 239    | 240    |
| Massachusetts        | 625   | 668    | 681    | 221          | 190    | 258    |
| Michigan             | 1,224   | 1,234  | 1,349  | 524          | 586    | 623    |
| Minnesota            | 399   | 421    | 457    | 160          | 188    | 219    |
| Mississippi          | 638   | 640    | 692    | 278          | 314    | 297    |
| Missouri             | 659   | 789    | 829    | 323          | 353    | 405    |
| Montana              | 124   | 120    | 121    | 59           | 56     | 53     |
| Nebraska             | 191   | 189    | 191    | 96           | 97     | 105    |
| Nevada               | 221   | 237    | 276    | 101          | 126    | 133    |
| New Hampshire        | 89  | 95     | 100    | 40           | 37     | 44     |
| New Jersey           | 700   | 759    | 790    | 314          | 306    | 312    |
| New Mexico           | 322   | 328    | 354    | 171          | 180    | 190    |
| New York             | 2,758   | 2,872  | 2,813  | 1,303        | 1,327  | 1,290  |
| North Carolina       | 1,313   | 1,380  | 1,444  | 566          | 690    | 707    |
| North Dakota         | 70  | 68     | 67     | 36           | 34     | 35     |
| Ohio                 | 1,476   | 1,505  | 1,624  | 629          | 654    | 647    |
| Oklahoma             | 584   | 578    | 603    | 279          | 264    | 266    |
| Oregon               | 436   | 438    | 456    | 193          | 225    | 221    |
| Pennsylvania         | 1,508   | 1,540  | 1,578  | 629          | 587    | 607    |
| Rhode Island         | 129   | 133    | 136    | 39           | 50     | 50     |
| South Carolina       | 694   | 723    | 772    | 332          | 306    | 343    |
| South Dakota         | 100   | 98     | 102    | 52           | 52     | 46     |
| Tennessee            | 981   | 985    | 1,018  | 421          | 363    | 457    |
| Texas                | 3,842   | 4,093  | 4,344  | 2,153        | 2,259  | 2,403  |
| Utah                 | 222   | 227    | 236    | 125          | 123    | 129    |
| Vermont              | 62  | 64     | 66     | 28           | 25     | 34     |
| Virginia             | 770   | 815    | 849    | 376          | 389    | 420    |
| Washington           | 655   | 664    | 709    | 305          | 277    | 304    |
| West Virginia        | 320   | 300    | 295    | 121          | 105    | 113    |
| Wisconsin            | 553   | 566    | 604    | 261          | 289    | 322    |
| Wyoming              | 50  | 48     | 49     | 25           | 22     | 22     |
| United States        | 37,418  | 38,922 | 41,055 | 17,907       | 18,671 | 19,685 |

Table III.3. Approximate 90-Percent Confidence Intervals for Final Shrinkage Estimates for 2006, All Eligible People

|                      | Approximate 90-Percent Confidence Intervals for 2006, All Eligible People |             |                                       |             |
|----------------------|---|-------------|---------------------------------------|-------------|
|                      | Participation Rate (Percent)  |             | Number of Eligible People (Thousands) |             |
|                      | Lower Bound   | Upper Bound | Lower Bound                           | Upper Bound |
| Alabama              | 63  | 71          | 743                                   | 842         |
| Alaska               | 68  | 81          | 67                                    | 80          |
| Arizona              | 57  | 64          | 807                                   | 903         |
| Arkansas             | 71  | 79          | 469                                   | 520         |
| California           | 48  | 53          | 3,730                                 | 4,137       |
| Colorado             | 52  | 62          | 391                                   | 470         |
| Connecticut          | 66  | 74          | 276                                   | 309         |
| Delaware             | 68  | 77          | 77                                    | 88          |
| District of Columbia | 76  | 93          | 90                                    | 112         |
| Florida              | 56  | 63          | 1,873                                 | 2,114       |
| Georgia              | 63  | 71          | 1,281                                 | 1,437       |
| Hawaii               | 70  | 83          | 105                                   | 123         |
| Idaho                | 49  | 57          | 155                                   | 182         |
| Illinois             | 77  | 84          | 1,422                                 | 1,560       |
| Indiana              | 68  | 75          | 743                                   | 825         |
| Iowa                 | 66  | 75          | 292                                   | 332         |
| Kansas               | 55  | 63          | 281                                   | 323         |
| Kentucky             | 75  | 84          | 682                                   | 766         |
| Louisiana            | 75  | 84          | 740                                   | 827         |
| Maine                | 84  | 95          | 157                                   | 177         |
| Maryland             | 59  | 69          | 415                                   | 482         |
| Massachusetts        | 61  | 71          | 581                                   | 668         |
| Michigan             | 79  | 89          | 1,152                                 | 1,296       |
| Minnesota            | 59  | 68          | 372                                   | 427         |
| Mississippi          | 58  | 69          | 583                                   | 693         |
| Missouri             | 81  | 89          | 628                                   | 691         |
| Montana              | 58  | 68          | 113                                   | 134         |
| Nebraska             | 57  | 66          | 178                                   | 204         |
| Nevada               | 48  | 58          | 199                                   | 242         |
| New Hampshire        | 57  | 66          | 83                                    | 95          |
| New Jersey           | 53  | 60          | 655                                   | 745         |
| New Mexico           | 70  | 78          | 304                                   | 341         |
| New York             | 60  | 67          | 2,619                                 | 2,897       |
| North Carolina       | 61  | 67          | 1,250                                 | 1,376       |
| North Dakota         | 52  | 61          | 65                                    | 76          |
| Ohio                 | 66  | 73          | 1,405                                 | 1,548       |
| Oklahoma             | 69  | 76          | 554                                   | 614         |
| Oregon               | 83  | 94          | 411                                   | 462         |
| Pennsylvania         | 67  | 75          | 1,421                                 | 1,594       |
| Rhode Island         | 52  | 60          | 120                                   | 138         |
| South Carolina       | 71  | 79          | 657                                   | 731         |
| South Dakota         | 53  | 63          | 91                                    | 109         |
| Tennessee            | 81  | 91          | 925                                   | 1,037       |
| Texas                | 60  | 66          | 3,677                                 | 4,006       |
| Utah                 | 54  | 62          | 206                                   | 237         |
| Vermont              | 68  | 77          | 58                                    | 66          |
| Virginia             | 60  | 68          | 719                                   | 821         |
| Washington           | 76  | 85          | 618                                   | 693         |
| West Virginia        | 75  | 86          | 299                                   | 342         |
| Wisconsin            | 57  | 64          | 521                                   | 585         |
| Wyoming              | 41  | 54          | 43                                    | 57          |
| United States        | 66  | 68          | 36,760                                | 38,075      |

Table III.4. Approximate 90-Percent Confidence Intervals for Final Shrinkage Estimates for 2007, All Eligible People

|                      | Approximate 90-Percent Confidence Intervals for 2007, All Eligible People |             |                                       |             |
|----------------------|---|-------------|---------------------------------------|-------------|
|                      | Participation Rate (Percent)  |             | Number of Eligible People (Thousands) |             |
|                      | Lower Bound   | Upper Bound | Lower Bound                           | Upper Bound |
| Alabama              | 62  | 71          | 757                                   | 856         |
| Alaska               | 68  | 80          | 68                                    | 80          |
| Arizona              | 56  | 63          | 839                                   | 942         |
| Arkansas             | 71  | 79          | 466                                   | 519         |
| California           | 46  | 51          | 3,947                                 | 4,345       |
| Colorado             | 50  | 59          | 413                                   | 488         |
| Connecticut          | 62  | 70          | 289                                   | 325         |
| Delaware             | 64  | 74          | 82                                    | 94          |
| District of Columbia | 73  | 87          | 95                                    | 113         |
| Florida              | 54  | 61          | 1,975                                 | 2,240       |
| Georgia              | 58  | 66          | 1,384                                 | 1,561       |
| Hawaii               | 69  | 81          | 109                                   | 127         |
| Idaho                | 46  | 55          | 155                                   | 183         |
| Illinois             | 77  | 85          | 1,442                                 | 1,584       |
| Indiana              | 67  | 75          | 759                                   | 839         |
| Iowa                 | 70  | 79          | 291                                   | 329         |
| Kansas               | 55  | 62          | 289                                   | 329         |
| Kentucky             | 79  | 88          | 670                                   | 748         |
| Louisiana            | 73  | 81          | 776                                   | 863         |
| Maine                | 84  | 94          | 156                                   | 174         |
| Maryland             | 55  | 64          | 458                                   | 535         |
| Massachusetts        | 60  | 69          | 621                                   | 714         |
| Michigan             | 86  | 97          | 1,161                                 | 1,308       |
| Minnesota            | 59  | 68          | 392                                   | 449         |
| Mississippi          | 61  | 71          | 590                                   | 690         |
| Missouri             | 80  | 88          | 753                                   | 826         |
| Montana              | 60  | 70          | 110                                   | 129         |
| Nebraska             | 59  | 67          | 177                                   | 202         |
| Nevada               | 46  | 56          | 215                                   | 259         |
| New Hampshire        | 55  | 64          | 88                                    | 102         |
| New Jersey           | 50  | 57          | 707                                   | 810         |
| New Mexico           | 65  | 74          | 307                                   | 349         |
| New York             | 58  | 65          | 2,725                                 | 3,019       |
| North Carolina       | 60  | 67          | 1,314                                 | 1,446       |
| North Dakota         | 58  | 67          | 63                                    | 73          |
| Ohio                 | 66  | 72          | 1,432                                 | 1,577       |
| Oklahoma             | 67  | 74          | 547                                   | 609         |
| Oregon               | 87  | 97          | 412                                   | 463         |
| Pennsylvania         | 68  | 77          | 1,451                                 | 1,629       |
| Rhode Island         | 53  | 60          | 124                                   | 142         |
| South Carolina       | 70  | 77          | 688                                   | 758         |
| South Dakota         | 56  | 66          | 90                                    | 106         |
| Tennessee            | 81  | 90          | 931                                   | 1,039       |
| Texas                | 53  | 59          | 3,892                                 | 4,294       |
| Utah                 | 50  | 57          | 210                                   | 243         |
| Vermont              | 69  | 77          | 60                                    | 68          |
| Virginia             | 57  | 66          | 760                                   | 870         |
| Washington           | 74  | 83          | 627                                   | 702         |
| West Virginia        | 81  | 93          | 280                                   | 321         |
| Wisconsin            | 59  | 66          | 535                                   | 597         |
| Wyoming              | 40  | 51          | 42                                    | 54          |
| United States        | 64  | 67          | 38,240                                | 39,603      |



Table III.5. Approximate 90-Percent Confidence Intervals for Final Shrinkage Estimates for 2008, All Eligible People

|                      | Approximate 90-Percent Confidence Intervals for 2008, All Eligible People |             |                                       |             |
|----------------------|---|-------------|---------------------------------------|-------------|
|                      | Participation Rate (Percent)  |             | Number of Eligible People (Thousands) |             |
|                      | Lower Bound   | Upper Bound | Lower Bound                           | Upper Bound |
| Alabama              | 63  | 71          | 794                                   | 894         |
| Alaska               | 64  | 76          | 71                                    | 84          |
| Arizona              | 58  | 65          | 911                                   | 1,014       |
| Arkansas             | 67  | 75          | 495                                   | 552         |
| California           | 48  | 53          | 4,170                                 | 4,577       |
| Colorado             | 48  | 56          | 439                                   | 519         |
| Connecticut          | 62  | 70          | 309                                   | 346         |
| Delaware             | 61  | 70          | 95                                    | 109         |
| District of Columbia | 77  | 94          | 91                                    | 110         |
| Florida              | 58  | 66          | 2,195                                 | 2,470       |
| Georgia              | 61  | 68          | 1,480                                 | 1,660       |
| Hawaii               | 73  | 84          | 113                                   | 130         |
| Idaho                | 50  | 59          | 167                                   | 194         |
| Illinois             | 76  | 83          | 1,537                                 | 1,687       |
| Indiana              | 66  | 73          | 828                                   | 915         |
| Iowa                 | 71  | 80          | 306                                   | 344         |
| Kansas               | 53  | 61          | 298                                   | 343         |
| Kentucky             | 82  | 91          | 679                                   | 755         |
| Louisiana            | 68  | 76          | 842                                   | 937         |
| Maine                | 90  | 99          | 159                                   | 176         |
| Maryland             | 57  | 66          | 512                                   | 591         |
| Massachusetts        | 65  | 75          | 635                                   | 726         |
| Michigan             | 80  | 91          | 1,269                                 | 1,430       |
| Minnesota            | 58  | 67          | 425                                   | 489         |
| Mississippi          | 60  | 68          | 646                                   | 738         |
| Missouri             | 79  | 87          | 792                                   | 866         |
| Montana              | 60  | 70          | 112                                   | 131         |
| Nebraska             | 58  | 67          | 179                                   | 204         |
| Nevada               | 47  | 56          | 250                                   | 301         |
| New Hampshire        | 57  | 66          | 93                                    | 107         |
| New Jersey           | 50  | 58          | 735                                   | 845         |
| New Mexico           | 62  | 71          | 332                                   | 376         |
| New York             | 64  | 71          | 2,674                                 | 2,953       |
| North Carolina       | 62  | 68          | 1,377                                 | 1,511       |
| North Dakota         | 62  | 72          | 62                                    | 72          |
| Ohio                 | 67  | 73          | 1,552                                 | 1,697       |
| Oklahoma             | 64  | 71          | 569                                   | 636         |
| Oregon               | 87  | 97          | 431                                   | 482         |
| Pennsylvania         | 70  | 78          | 1,493                                 | 1,663       |
| Rhode Island         | 58  | 65          | 128                                   | 144         |
| South Carolina       | 71  | 78          | 734                                   | 809         |
| South Dakota         | 57  | 66          | 94                                    | 110         |
| Tennessee            | 83  | 92          | 965                                   | 1,071       |
| Texas                | 53  | 58          | 4,141                                 | 4,548       |
| Utah                 | 51  | 60          | 217                                   | 255         |
| Vermont              | 75  | 83          | 63                                    | 70          |
| Virginia             | 59  | 67          | 793                                   | 904         |
| Washington           | 75  | 84          | 669                                   | 749         |
| West Virginia        | 86  | 97          | 277                                   | 313         |
| Wisconsin            | 60  | 66          | 572                                   | 637         |
| Wyoming              | 40  | 52          | 43                                    | 54          |
| United States        | 65  | 67          | 40,376                                | 41,735      |

Table III.6. Approximate 90-Percent Confidence Intervals for Final Shrinkage Estimates for 2006, Working Poor

|                      | Approximate 90-Percent Confidence Intervals for 2006, Working Poor |             |                                       |             |
|----------------------|--|-------------|---------------------------------------|-------------|
|                      | Participation Rate (Percent)                                       |             | Number of Eligible People (Thousands) |             |
|                      | Lower Bound  | Upper Bound | Lower Bound                           | Upper Bound |
| Alabama              | 54   | 67          | 296                                   | 366         |
| Alaska               | 60   | 79          | 31                                    | 41          |
| Arizona              | 50   | 61          | 423                                   | 517         |
| Arkansas             | 63   | 76          | 211                                   | 251         |
| California           | 31   | 40          | 1,950                                 | 2,501       |
| Colorado             | 39   | 53          | 162                                   | 222         |
| Connecticut          | 46   | 59          | 97                                    | 124         |
| Delaware             | 61   | 78          | 34                                    | 44          |
| District of Columbia | 28   | 51          | 23                                    | 42          |
| Florida              | 43   | 55          | 795                                   | 1,014       |
| Georgia              | 50   | 63          | 650                                   | 813         |
| Hawaii               | 50   | 67          | 53                                    | 71          |
| Idaho                | 44   | 57          | 78                                    | 103         |
| Illinois             | 61   | 74          | 619                                   | 744         |
| Indiana              | 65   | 78          | 309                                   | 369         |
| Iowa                 | 60   | 73          | 140                                   | 171         |
| Kansas               | 43   | 55          | 151                                   | 189         |
| Kentucky             | 63   | 79          | 267                                   | 333         |
| Louisiana            | 66   | 81          | 325                                   | 398         |
| Maine                | 71   | 90          | 62                                    | 79          |
| Maryland             | 40   | 55          | 179                                   | 247         |
| Massachusetts        | 35   | 48          | 188                                   | 255         |
| Michigan             | 76   | 93          | 471                                   | 578         |
| Minnesota            | 45   | 58          | 139                                   | 180         |
| Mississippi          | 51   | 67          | 240                                   | 317         |
| Missouri             | 70   | 84          | 294                                   | 353         |
| Montana              | 52   | 69          | 51                                    | 67          |
| Nebraska             | 48   | 60          | 85                                    | 107         |
| Nevada               | 39   | 54          | 85                                    | 117         |
| New Hampshire        | 42   | 56          | 34                                    | 46          |
| New Jersey           | 37   | 49          | 270                                   | 357         |
| New Mexico           | 64   | 78          | 155                                   | 188         |
| New York             | 40   | 53          | 1,130                                 | 1,476       |
| North Carolina       | 51   | 62          | 514                                   | 617         |
| North Dakota         | 43   | 59          | 30                                    | 41          |
| Ohio                 | 60   | 71          | 575                                   | 683         |
| Oklahoma             | 59   | 71          | 253                                   | 305         |
| Oregon               | 69   | 86          | 171                                   | 215         |
| Pennsylvania         | 55   | 68          | 563                                   | 695         |
| Rhode Island         | 29   | 41          | 32                                    | 46          |
| South Carolina       | 59   | 73          | 298                                   | 366         |
| South Dakota         | 49   | 64          | 45                                    | 59          |
| Tennessee            | 64   | 80          | 375                                   | 467         |
| Texas                | 50   | 59          | 1,983                                 | 2,323       |
| Utah                 | 44   | 55          | 111                                   | 139         |
| Vermont              | 51   | 67          | 24                                    | 32          |
| Virginia             | 43   | 57          | 325                                   | 427         |
| Washington           | 59   | 74          | 271                                   | 340         |
| West Virginia        | 70   | 90          | 105                                   | 136         |
| Wisconsin            | 51   | 63          | 234                                   | 289         |
| Wyoming              | 37   | 57          | 20                                    | 30          |
| United States        | 54   | 58          | 17,265                                | 18,549      |

Table III.7. Approximate 90-Percent Confidence Intervals for Final Shrinkage Estimates for 2007, Working Poor

|                      | Approximate 90-Percent Confidence Intervals for 2007, Working Poor |             |                                       |             |
|----------------------|--|-------------|---------------------------------------|-------------|
|                      | Participation Rate (Percent)                                       |             | Number of Eligible People (Thousands) |             |
|                      | Lower Bound  | Upper Bound | Lower Bound                           | Upper Bound |
| Alabama              | 55   | 68          | 313                                   | 388         |
| Alaska               | 52   | 71          | 33                                    | 45          |
| Arizona              | 50   | 61          | 391                                   | 480         |
| Arkansas             | 63   | 76          | 211                                   | 258         |
| California           | 30   | 38          | 2,149                                 | 2,707       |
| Colorado             | 38   | 51          | 194                                   | 265         |
| Connecticut          | 45   | 57          | 106                                   | 136         |
| Delaware             | 50   | 66          | 36                                    | 48          |
| District of Columbia | 26   | 51          | 22                                    | 42          |
| Florida              | 42   | 54          | 816                                   | 1,049       |
| Georgia              | 46   | 58          | 731                                   | 920         |
| Hawaii               | 49   | 67          | 56                                    | 77          |
| Idaho                | 45   | 58          | 77                                    | 100         |
| Illinois             | 61   | 73          | 617                                   | 742         |
| Indiana              | 61   | 73          | 339                                   | 406         |
| Iowa                 | 63   | 77          | 152                                   | 186         |
| Kansas               | 44   | 54          | 155                                   | 191         |
| Kentucky             | 71   | 87          | 242                                   | 297         |
| Louisiana            | 62   | 76          | 362                                   | 445         |
| Maine                | 77   | 95          | 58                                    | 71          |
| Maryland             | 37   | 52          | 198                                   | 279         |
| Massachusetts        | 40   | 54          | 162                                   | 219         |
| Michigan             | 75   | 93          | 522                                   | 650         |
| Minnesota            | 46   | 60          | 164                                   | 213         |
| Mississippi          | 50   | 67          | 270                                   | 358         |
| Missouri             | 69   | 82          | 322                                   | 384         |
| Montana              | 56   | 73          | 49                                    | 64          |
| Nebraska             | 52   | 65          | 86                                    | 107         |
| Nevada               | 31   | 44          | 105                                   | 148         |
| New Hampshire        | 46   | 60          | 32                                    | 42          |
| New Jersey           | 38   | 51          | 264                                   | 348         |
| New Mexico           | 57   | 71          | 160                                   | 201         |
| New York             | 42   | 55          | 1,160                                 | 1,494       |
| North Carolina       | 52   | 63          | 629                                   | 751         |
| North Dakota         | 52   | 67          | 30                                    | 39          |
| Ohio                 | 56   | 66          | 598                                   | 711         |
| Oklahoma             | 57   | 69          | 238                                   | 290         |
| Oregon               | 70   | 89          | 199                                   | 251         |
| Pennsylvania         | 60   | 74          | 527                                   | 646         |
| Rhode Island         | 34   | 46          | 42                                    | 57          |
| South Carolina       | 57   | 70          | 276                                   | 337         |
| South Dakota         | 50   | 65          | 45                                    | 58          |
| Tennessee            | 67   | 82          | 326                                   | 400         |
| Texas                | 43   | 51          | 2,058                                 | 2,460       |
| Utah                 | 44   | 55          | 109                                   | 137         |
| Vermont              | 58   | 73          | 22                                    | 28          |
| Virginia             | 45   | 59          | 338                                   | 440         |
| Washington           | 55   | 70          | 245                                   | 310         |
| West Virginia        | 84   | 100         | 93                                    | 117         |
| Wisconsin            | 54   | 66          | 260                                   | 319         |
| Wyoming              | 38   | 55          | 18                                    | 26          |
| United States        | 53   | 57          | 18,004                                | 19,338      |

Table III.8. Approximate 90-Percent Confidence Intervals for Final Shrinkage Estimates for 2008, Working Poor

|                      | Approximate 90-Percent Confidence Intervals for 2008, Working Poor |             |                                       |             |
|----------------------|--|-------------|---------------------------------------|-------------|
|                      | Participation Rate (Percent)                                       |             | Number of Eligible People (Thousands) |             |
|                      | Lower Bound  | Upper Bound | Lower Bound                           | Upper Bound |
| Alabama              | 54   | 67          | 325                                   | 399         |
| Alaska               | 58   | 79          | 32                                    | 43          |
| Arizona              | 49   | 60          | 462                                   | 564         |
| Arkansas             | 58   | 71          | 221                                   | 269         |
| California           | 28   | 35          | 2,304                                 | 2,917       |
| Colorado             | 34   | 47          | 210                                   | 289         |
| Connecticut          | 44   | 56          | 113                                   | 145         |
| Delaware             | 54   | 69          | 43                                    | 56          |
| District of Columbia | 29   | 52          | 20                                    | 36          |
| Florida              | 42   | 54          | 875                                   | 1,115       |
| Georgia              | 47   | 59          | 760                                   | 952         |
| Hawaii               | 50   | 66          | 58                                    | 78          |
| Idaho                | 46   | 59          | 88                                    | 113         |
| Illinois             | 60   | 72          | 683                                   | 819         |
| Indiana              | 62   | 74          | 323                                   | 384         |
| Iowa                 | 65   | 78          | 144                                   | 175         |
| Kansas               | 43   | 54          | 159                                   | 199         |
| Kentucky             | 69   | 84          | 207                                   | 253         |
| Louisiana            | 60   | 73          | 366                                   | 445         |
| Maine                | 76   | 94          | 61                                    | 75          |
| Maryland             | 39   | 53          | 204                                   | 276         |
| Massachusetts        | 39   | 53          | 219                                   | 296         |
| Michigan             | 74   | 92          | 557                                   | 688         |
| Minnesota            | 44   | 58          | 188                                   | 249         |
| Mississippi          | 53   | 67          | 262                                   | 332         |
| Missouri             | 68   | 82          | 369                                   | 441         |
| Montana              | 54   | 71          | 46                                    | 60          |
| Nebraska             | 51   | 63          | 94                                    | 117         |
| Nevada               | 34   | 48          | 110                                   | 155         |
| New Hampshire        | 43   | 57          | 38                                    | 50          |
| New Jersey           | 35   | 47          | 266                                   | 357         |
| New Mexico           | 57   | 70          | 169                                   | 210         |
| New York             | 42   | 54          | 1,124                                 | 1,456       |
| North Carolina       | 52   | 63          | 643                                   | 772         |
| North Dakota         | 54   | 70          | 31                                    | 40          |
| Ohio                 | 59   | 70          | 592                                   | 702         |
| Oklahoma             | 55   | 67          | 240                                   | 292         |
| Oregon               | 69   | 86          | 196                                   | 246         |
| Pennsylvania         | 58   | 71          | 545                                   | 670         |
| Rhode Island         | 34   | 45          | 43                                    | 57          |
| South Carolina       | 60   | 73          | 309                                   | 378         |
| South Dakota         | 54   | 69          | 40                                    | 51          |
| Tennessee            | 66   | 81          | 412                                   | 503         |
| Texas                | 43   | 51          | 2,197                                 | 2,610       |
| Utah                 | 42   | 55          | 112                                   | 146         |
| Vermont              | 57   | 73          | 30                                    | 38          |
| Virginia             | 45   | 58          | 365                                   | 475         |
| Washington           | 57   | 73          | 269                                   | 340         |
| West Virginia        | 80   | 100         | 100                                   | 127         |
| Wisconsin            | 54   | 66          | 289                                   | 354         |
| Wyoming              | 41   | 59          | 18                                    | 25          |
| United States        | 52   | 56          | 19,010                                | 20,361      |

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## APPENDIX A

### THE ESTIMATION PROCEDURE: ADDITIONAL TECHNICAL DETAILS

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This appendix provides additional information and technical details about our four-step procedure to estimate state Supplemental Nutrition Assistance Program (SNAP) participation rates for all eligible people and the working poor. Each step is discussed in turn.

# 1. From CPS Data and SNAP Administrative Data, Derive Direct Sample Estimates of State SNAP Participation Rates for Each of the Three Years 2006 to 2008

Table A.1 displays direct sample estimates of participation rates for all eligible people and for the working poor, and Table A.2 presents standard errors for the direct sample estimates. The method for obtaining the standard errors is described later.

We derived direct sample estimates of participation rates for all eligible people for a given year according to:

$$(1) \quad Y_{1,i} = 100 \frac{P_i(\epsilon_{1,i}/100)}{(E_{1,i}/100)T_i},$$

where  $Y_{1,i}$  is the estimated participation rate for all eligible people for state  $i$ ;  $P_i$  is the number of people participating in SNAP in the year in question according to SNAP Statistical Summary of Operations (“Program Operations”) data;  $\epsilon_{1,i}$  is the percentage of participating people who are income eligible and correctly receiving benefits according to SNAP Quality Control (SNAP QC) data;  $E_{1,i}$  is the number of people who are eligible for the SNAP according to the CPS, expressed as a percentage of the CPS population; and  $T_i$  is the resident population according to decennial census and administrative records (mainly vital statistics) data.<sup>1,2,3</sup>

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<sup>1</sup>  $P_i$  is adjusted to exclude from our estimate of participants those people who received SNAP benefits only because of a natural disaster and, thus, are not included in our estimate of eligibles. Because  $P_i$  is obtained from SNAP Program Operations data, which include the full population of SNAP cases, it is not subject to sampling error. Participant figures, including counts of participants eligible only through disaster assistance, were provided by the Food and Nutrition Service (FNS). We also adjusted  $P_i$  to exclude from our estimates of participants two additional groups. First, we exclude participants who were ineligible for SNAP but received benefits in error. Second, we exclude participants who would not pass the federal SNAP income tests but were eligible through state expanded categorical eligibility rules. These people cannot be identified in the CPS data and, thus, are not included in our estimates of eligibles.

Similarly, we derived sample estimates of participation rates for the working poor for a given year according to:

$$(2) \quad Y_{2,i} = 100 \frac{P_i(\varepsilon_{2,i}/100)}{(E_{2,i}/100)T_i},$$

where  $Y_{2,i}$  is the estimated participation rate for the working poor for state  $i$ ;  $\varepsilon_{2,i}$  is the percentage of participating people who are working poor, income eligible, and correctly receiving SNAP benefits according to SNAP QC data;  $E_{2,i}$  is the number of people who are working poor and eligible for SNAP according to the CPS, expressed as a percentage of the CPS population; and  $P_i$  and  $T_i$  are as defined above.<sup>4</sup>

As noted, we estimated eligibility percentages rather than eligibility counts from the CPS. Estimated percentages are more precise than estimated counts because the sampling errors in the numerators and denominators of percentages tend to be positively correlated and, therefore, partially “cancel out.”

Table A.3 presents estimates of the number of people participating in SNAP, and Table A.4 presents the population totals. Table A.5 presents the percentages of participating people who are income eligible and correctly receiving SNAP benefits and who are working poor, income eligible, and correctly receiving SNAP benefits. Table A.6 displays direct sample estimates of SNAP eligibility percentages for all eligible people and for the working poor.

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(continued)

<sup>2</sup> We obtained estimates for 2006 to 2008 from the CPS ASEC samples for 2007 to 2009, for which the survey instruments collected family income data for the prior calendar years, that is, 2006 to 2008.

<sup>3</sup> In broad terms, the population estimates derived by the Census Bureau in its Population Estimates Program are obtained by subtracting from census counts people “exiting” the population (due to death or net out-migration) and adding people “entering” the population (due to birth or net in-migration). Population estimates are available at <http://www.census.gov/popest/datasets.html>.

<sup>4</sup> We use the same adjustment methodology for eligible working poor participants as for all eligible participants.

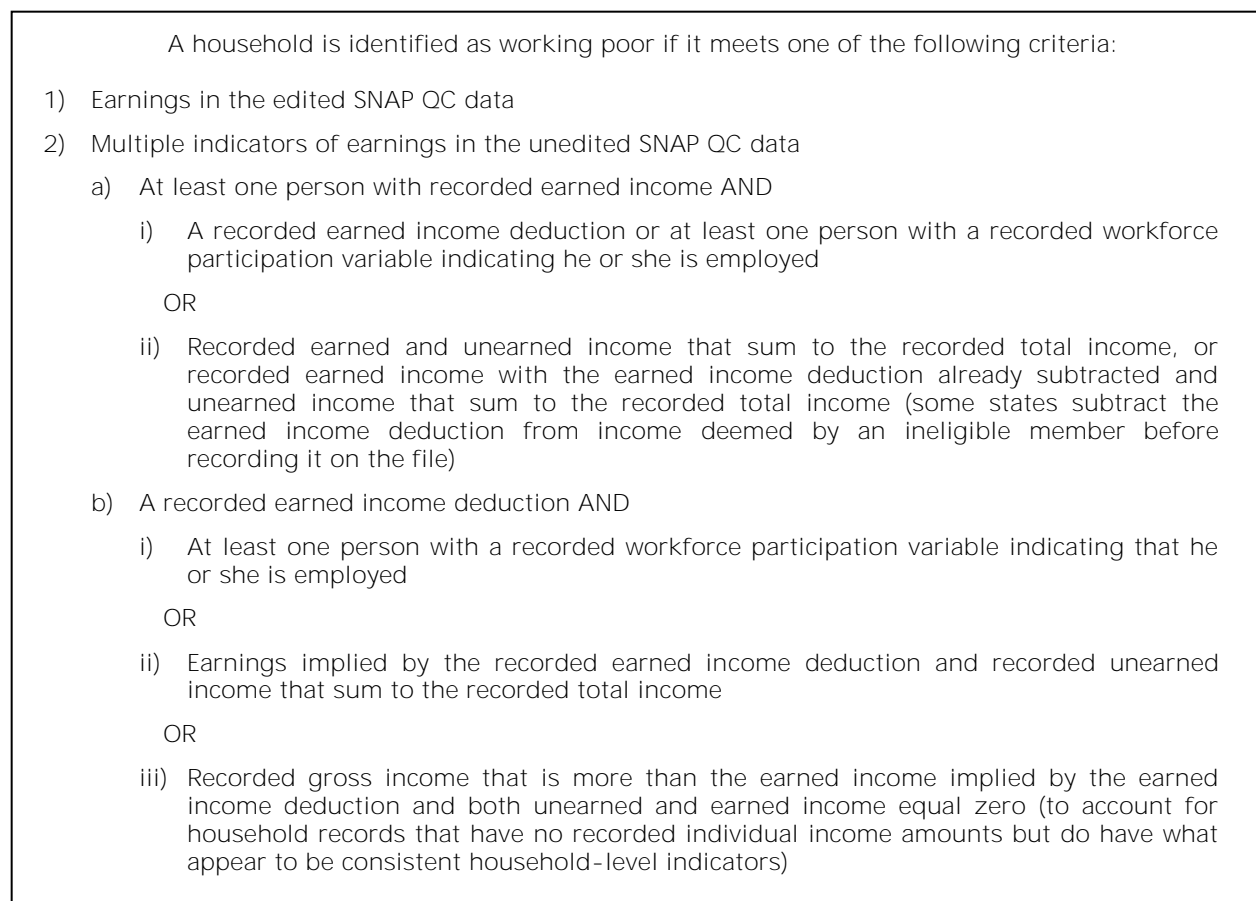
We define as “working poor” any person who is eligible for SNAP and lives in a household in which a member earns money from a job. Working poor who are participating in SNAP are identified slightly differently in the SNAP QC data than in the CPS. In the SNAP QC data, they are identified not just by their earnings but also by other indicators of earnings that suggest a household was very likely to have a member who worked. Specifically, a household is identified as working poor if the household had earnings according to the edited SNAP QC datafile, or if prior to the editing process, multiple earnings indicators suggest that a member of the household was working (Figure A.1).<sup>5</sup> In Table A.7 we show the percentage of participating households that are correctly eligible and working poor based on the indicators that suggest a member was working. The first column shows the percentage of participants in households identified as working poor based on the edited SNAP QC datafile. The second column shows the additional percentage that were counted as working poor based on other household information.

We derived SNAP eligibility estimates for states by applying SNAP rules to CPS households. However, some key information needed to determine whether a household is eligible for SNAP is not collected in the CPS. For example, there are no data on asset balances or expenses deductible from gross income. Also, it is not possible to ascertain directly which members of a dwelling unit purchase and prepare food together or which members may be ineligible for SNAP under provisions of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (P.L. 104-193) and subsequent legislation pertaining to noncitizens and nonelderly nondisabled childless adults subject to work registration. Yet another limitation is that only annual, rather than monthly, income amounts are recorded.

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<sup>5</sup> Wolkwitz and Ewell (2009) describe the procedure for editing the SNAP QC data to ensure consistency between a household’s income and SNAP benefit.

Figure A.1. Algorithm to Identify Working Poor Households



Methods have been developed to address these data limitations. These methods—including procedures for identifying the members of the SNAP household within the (potentially) larger CPS household, taking account of the restrictions on participation by noncitizens and nonelderly nondisabled childless adults, distributing annual amounts across months, and imputing net income—are described in Leftin (2010) and earlier reports in that series.<sup>6,7</sup> After Leftin 2010 was issued, revised Missouri participation data became available that resulted in a 0.5 percentage point

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<sup>6</sup> These reports also describe how we applied SNAP gross and net income tests and calculated the benefits for which an eligible household would qualify.

<sup>7</sup> Because our focus in this document is on participation among people who are eligible for SNAP, these estimates of SNAP eligibility counts and participation rates do not include people who are not legally entitled to receive SNAP benefits, such as Supplemental Security Income (SSI) recipients in California who receive cash in lieu of SNAP benefits. We excluded these SSI recipients when identifying the members of SNAP households. It might be useful in other contexts, however, to consider participation rates among those eligible for the SNAP or a cash substitute.

drop in the estimated national SNAP participation rate from 66.8 percent to 66.3 percent. The analysis and results presented here and in Cunyningham and Castner (2010) are based on the corrected data.

In addition to our point estimates of participation rates, we need estimates of their sampling variability. We can estimate the variances of  $Y_{1,i}$  and  $Y_{2,i}$  as follows:<sup>8</sup>

$$(3) \quad \text{var}(Y_{1,i}) = \text{variance due to } E_{1,i} \text{ when } \varepsilon_{1,i} \text{ is fixed} + \text{variance due to } \varepsilon_{1,i} \text{ when } E_{1,i} \text{ is fixed} \\ = \text{var}_{E_1|\varepsilon_1}(Y_{1,i}) + \text{var}_{\varepsilon_1|E_1}(Y_{1,i})$$

and

$$(4) \quad \text{var}(Y_{2,i}) = \text{variance due to } E_{2,i} \text{ when } \varepsilon_{2,i} \text{ is fixed} + \text{variance due to } \varepsilon_{2,i} \text{ when } E_{2,i} \text{ is fixed} \\ = \text{var}_{E_2|\varepsilon_2}(Y_{2,i}) + \text{var}_{\varepsilon_2|E_2}(Y_{2,i}).$$

When a variable is held fixed, we fix it at its point estimate. Note that we do not include covariance terms in these expressions because the estimates of  $E_{1,i}$  and  $\varepsilon_{1,i}$ —like the estimates of  $E_{2,i}$  and  $\varepsilon_{2,i}$ —are based on independent samples.

For a given year, we estimated  $\text{var}_{E_1|\varepsilon_1}(Y_{1,i})$  and  $\text{var}_{E_2|\varepsilon_2}(Y_{2,i})$  using a replication method called the Successive Difference Replication Method (SDRM) with 160 replicate weights developed by the U.S. Census Bureau for the CPS ASEC; that is

$$(5) \quad \text{var}_{E_1|\varepsilon_1}(Y_{1,i}) = \frac{4}{160} \sum_{r=1}^{160} (Y_{1,i(r)} - Y_{1,i})^2,$$

where  $Y_{1,i(r)}$  is the  $r$ th ( $r = 1, 2, \dots, 160$ ) replicate estimate with the same form as  $Y_{1,i}$  and calculated using the  $r$ th set of replicate weights.

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<sup>8</sup> Correctly-eligible rates are estimated from SNAP QC sample data and are subject to sampling error, although it is small relative to other sources of error in the estimated participation rates. In taking into account this sampling error when deriving the estimates presented here, we take into account its correlation with the sampling error associated with the identification of the working poor participants, also estimated using the SNAP QC data. That is, we take into account the correlation between  $\varepsilon_{1,i}$ , the correctly eligible rate, and  $\varepsilon_{2,i}$ , the correctly eligible working poor rate.

To obtain the estimated participation rate for all eligible people for state  $i$ ,  $Y_{1,i}$  we let  $Z_{1,i}$  equal the CPS sample estimate of the number of eligible people in state  $i$  ( $i = 1, 2, \dots, 51$ ) and we let  $N_i$  equal the CPS sample estimate of the population in state  $i$ , so that  $E_{1,i}$  equals the CPS sample estimate of the percentage eligible in state  $i$ :

$$(6) \quad E_{1,i} = 100 \frac{Z_{1,i}}{N_i}.$$

The replicate estimates  $Y_{1,i(r)}$  are then obtained by replicating  $E_{1,i}$ ; that is,

$$(7) \quad E_{1,i(r)} = 100 \frac{Z_{1,i(r)}}{N_{i(r)}}$$

and

$$(8) \quad Y_{1,i(r)} = 100 \frac{P_i(\varepsilon_{1,i}/100)}{(E_{1,i(r)}/100)T_i}.$$

Then, we can assess the degree of sampling variability (estimate the variance of  $Y_{1,i}$ ) by using formula (5).

We obtain estimates of sampling error variances pertaining to the participation rates for the working poor in the same manner, substituting  $Z_{2,i}$ , the CPS sample estimate of the number of eligible working poor in state  $i$ , for  $Z_{1,i}$ ;  $Z_{2,i(r)}$ , the  $r$ th replicate estimate of  $Z_{2,i}$ , for  $Z_{1,i(r)}$ ;  $E_{2,i}$  for  $E_{1,i}$ ;  $E_{2,i(r)}$  for  $E_{1,i(r)}$ ;  $\varepsilon_{2,i}$  for  $\varepsilon_{1,i}$ ; and  $Y_{2,i(r)}$  for  $Y_{1,i(r)}$ , in Equations (5) to (8). This results in:

$$(9) \quad \text{var}_{E_2|\varepsilon_2}(Y_{2,i}) = \frac{4}{160} \sum_{r=1}^{160} (Y_{2,i(r)} - Y_{2,i})^2.$$

Next, based on Equation (1) we can estimate  $\text{var}_{\varepsilon_1|E_1}(Y_{1,i})$  according to:

$$(10) \quad \text{var}_{\varepsilon_1|E_1}(Y_{1,i}) = \left( 100 \frac{P_i}{T_i E_{1,i}} \right)^2 \text{var}(\varepsilon_{1,i}),$$

since  $P_i$  and  $T_i$  are constants (or, at least, subject to negligible sampling variability) and  $E_{1,i}$  is held fixed at its point estimate. Also note that we estimated  $\varepsilon_{1,i}$  (the correctly-eligible rate) and  $\varepsilon_{2,i}$  (the percentage of participants who are working poor and correctly eligible) from the SNAP QC sample data as follows:

$$(11) \quad \varepsilon_{1,i} = 100 \frac{\sum_h m_{i,h} \varepsilon_{1,i,h}}{\sum_h m_{i,h}},$$

and

$$(12) \quad \varepsilon_{2,i} = 100 \frac{\sum_h m_{i,h} \varepsilon_{2,i,h}}{\sum_h m_{i,h}},$$

where  $h$  indexes households in a state's SNAP QC sample;  $m_{i,h}$  equals the number of people in household  $h$  times the weight for household  $h$ ;  $\varepsilon_{1,i,h}$  is an indicator that household  $h$  is eligible to receive SNAP benefits; and  $\varepsilon_{2,i,h}$  is an indicator that household  $h$  is working poor and eligible to receive SNAP benefits. Then:

$$(13) \quad \text{var}_{\varepsilon_1|E_1}(Y_{1,i}) = \left(100 \frac{P_i}{T_i E_{1,i}}\right)^2 \frac{1}{(\sum_h m_{i,h})^2} \left(\frac{n_i}{n_i - 1}\right) \sum_h m_{i,h}^2 \varepsilon_{1,i,h} - \varepsilon_{1,i}^2,$$

Where  $n_i$  is the total number of households from state  $i$  in the SNAP QC sample. Similarly, we estimate  $\text{var}_{\varepsilon_2|E_2}(Y_{2,i})$  according to:

$$(14) \quad \text{var}_{\varepsilon_2|E_2}(Y_{2,i}) = \left(100 \frac{P_i}{T_i E_{2,i}}\right)^2 \frac{1}{(\sum_h m_{i,h})^2} \left(\frac{n_i}{n_i - 1}\right) \sum_h m_{i,h}^2 \varepsilon_{2,i,h} - \varepsilon_{2,i}^2.$$

Summing the estimates from Equations (5) and (13)—as indicated by Equation (3)—and taking the square root of the sum provides an estimated standard error of the participation rate for all eligible people. Similarly, summing the estimates from Equations (9) and (14)—as indicated by

Equation (4)—and taking the square root of the sum provides an estimated standard error of the participation rate for the working poor. Estimated standard errors for the direct estimates of participation rates for all eligible people and for the working poor are presented in Tables A.3 and A.4, respectively.

We estimated the covariance between the estimates of participation rates for all eligible people and the working poor, for a given year, according to:<sup>9</sup>

$$(15) \quad \begin{aligned} \text{cov}(Y_{1,i}, Y_{2,i}) &= \text{covariance due to } E_{1,i} \text{ and } E_{2,i} \text{ when } \varepsilon_{1,i} \text{ and } \varepsilon_{2,i} \text{ are fixed} \\ &\quad + \text{covariance due to } \varepsilon_{1,i} \text{ and } \varepsilon_{2,i} \text{ when } E_{1,i} \text{ and } E_{2,i} \text{ are fixed} \\ &= \text{cov}_{E_1 E_2 | \varepsilon_1 \varepsilon_2}(Y_{1,i}, Y_{2,i}) + \text{cov}_{\varepsilon_1 \varepsilon_2 | E_1 E_2}(Y_{1,i}, Y_{2,i}). \end{aligned}$$

To derive an estimate of the first term in this expression, we obtained an SDRM estimate of the covariance due to  $E_{1,i}$  and  $E_{2,i}$  according to:

$$(16) \quad \text{cov}_{E_1 E_2 | \varepsilon_1 \varepsilon_2}(Y_{1,i}, Y_{2,i}) = \frac{4}{160} \sum_{r=1}^{160} (Y_{1,i(r)} - Y_{1,i})(Y_{2,i(r)} - Y_{2,i}).$$

For the second term, we estimated the covariance due to  $\varepsilon_{1,i}$  and  $\varepsilon_{2,i}$  according to:

$$(17) \quad \text{cov}_{\varepsilon_1 \varepsilon_2 | E_1 E_2}(Y_{1,i}, Y_{2,i}) = \left( 100 \frac{P_i}{T_i E_{1,i}} \right) \left( 100 \frac{P_i}{T_i E_{2,i}} \right) \text{cov}(\varepsilon_{1,i}, \varepsilon_{2,i})$$

where

$$(18) \quad \text{cov}(\varepsilon_{1,i}, \varepsilon_{2,i}) = \frac{1}{\left( \sum_h m_{i,h} \right)^2} \left( \frac{n_i}{n_i - 1} \right) \sum_h m_{i,h}^2 \varepsilon_{1,i,h} - \varepsilon_{1,i} \varepsilon_{2,i,h} - \varepsilon_{2,i}.$$

Because CPS samples from different years are not independent, participation rates for different years are correlated.<sup>10</sup> We derived a preliminary SDRM estimate of the correlation between  $Y_{1,i,t}$  and

<sup>9</sup> We do not need to include additional terms because the CPS and SNAP QC samples are independent.

<sup>10</sup> In contrast, SNAP QC samples from different years are independent. Hence, sampling variability in estimates from the CPS is the only source of intertemporal covariation between participation rates.



$Y_{2,i,t-g}$ , the sample estimate for all eligibles for one year (year  $t$ ) and the sample estimate for the working poor for  $g$  years earlier, as follow:

$$(19) \quad \text{cov}(Y_{1,i,t}, Y_{2,i,t-g}) = \frac{4}{160} \sum_{r=1}^{160} (Y_{1,i(r),t} - Y_{1,i,t})(Y_{2,i(r),t-g} - Y_{2,i,t-g}).$$

The correlation between  $Y_{1,i,t}$  and  $Y_{2,i,t-g}$  is:

$$(20) \quad \text{corr}(Y_{1,i,t}, Y_{2,i,t-g}) = \frac{\text{cov}(Y_{1,i,t}, Y_{2,i,t-g})}{\sqrt{\text{var}(Y_{1,i,t}) \text{var}(Y_{2,i,t-g})}}.$$

To improve the precision of estimated correlations (and covariances), we used a simple smoothing technique in which we “replaced” the state-specific correlation from Equation (20) by the average correlation between  $Y_{1,i,t}$  and  $Y_{2,i,t-g}$  across states:

$$(21) \quad \overline{\text{corr}}(Y_{1,t}, Y_{2,t-g}) = \frac{\sum_{i=1}^{51} (n_{i,t} + n_{i,t-g}) \text{corr}(Y_{1,i,t}, Y_{2,i,t-g})}{\sum_{i=1}^{51} (n_{i,t} + n_{i,t-g})},$$

where  $n_{i,t}$  and  $n_{i,t-g}$  are the (unweighted) number of households in the CPS ASEC samples for one year and  $g$  years earlier, respectively. Using this average correlation, we obtained as our final estimate of the covariance between  $Y_{1,i,t}$  and  $Y_{2,i,t-g}$ :

$$(22) \quad \text{cov}(Y_{1,i,t}, Y_{2,i,t-g}) = \overline{\text{corr}}(Y_{1,t}, Y_{2,t-g}) \sqrt{\text{var}(Y_{1,i,t}) \text{var}(Y_{2,i,t-g})}.$$

Other intertemporal covariances—such as the covariance between the participation rates for the working poor in two different years—are similarly estimated. As described under Step 3, the variances and covariances obtained in this step are the elements of a variance-covariance matrix used in deriving shrinkage estimates of participation rates.<sup>11</sup>

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<sup>11</sup> All interstate covariances equal zero because state samples are independent in both the CPS and the SNAP QC.

## 2. Using a Regression Model, Predict State SNAP Participation Rates Based on Administrative and ACS Data

Our regression model consisted of six equations, with three predicting SNAP participation rates for all eligible people in 2006, 2007, and 2008, and three predicting SNAP participation rates for the working poor in 2006, 2007, and 2008. The six equations were estimated jointly, and the values of the regression coefficients could vary from equation to equation. The predictors used were (in addition to an intercept):

- the percentage of the population income-eligible for SNAP and correctly receiving SNAP benefits
- the elderly combined poverty rate according to individual income tax data, namely, the percentage of elderly individuals who were not claimed on tax returns or were claimed on tax returns with adjusted gross income below the poverty level
- the percentage of households with a female householder, no husband present, and related children under 18 years according to 2006-2008 ACS three-year estimates
- the percentage of occupied housing units that were owner-occupied according to 2006-2008 ACS three-year estimates
- the percentage of renter-occupied housing units spending 30 percent or more of household income on rent and utilities according to 2006-2008 ACS three-year estimates
- the percentage of individuals 25 years and over who have completed a bachelor's degree according to 2006-2008 ACS three-year estimates
- the percentage of children under the federal poverty level according to 2006-2008 ACS three-year estimates

The values for the third through seventh predictors are the same in each of the six equations of our regression model. For the first two predictors, we used 2006 values in both equations for predicting 2006 participation rates, 2007 values in both equations for predicting 2007 rates, and 2008 values in both equations for predicting 2008 rates. Because prediction errors were allowed to be correlated and intergroup and intertemporal correlations among direct sample estimates were taken into account as specified in the next step, the shrinkage estimates for a group (all eligible people or the working poor) in any one year were determined by the predictions and sample estimates for all three years and both groups.

In addition to the predictors that we selected for our “best” model, we considered many other potential predictors measuring, for example, the percentage of individuals under 200 percent of the federal poverty level and the percentage of nonelderly adults under the federal poverty level. All of the predictors considered had three characteristics: (1) they are face valid, that is, it is plausible that they are good indicators of differences among states in SNAP participation rates; (2) they could be defined and measured uniformly across states; and (3) they could be obtained from nonsample or highly precise sample data—such as the ACS or administrative records data—and, thus, measured with little or no sampling error.

As shown in the next step, where we describe the regression estimation procedure in more detail, we do not have to calculate regression estimates as a separate step, although we do have to select a best regression model before we can calculate shrinkage estimates. We selected our best model on the basis of its strong relative performance in predicting participation rates, judging performance by examining functions of the regression residuals, such as mean squared error.<sup>12</sup> In addition to assessing the predictive fit of alternative specifications, we checked for potential biases as part of our extensive model evaluation. To check for biases, we looked for a persistent tendency to under- or overpredict the number of eligibles for certain types of states categorized by, for example, population size, region, and percentage of the population that is black or Hispanic. We found no strong evidence of correctable bias.

Definitions and data sources for the predictors in our best regression model are given in Table A.8. The values for the third through seventh predictors listed above are displayed in Table A.9. Values for the other predictors, which vary by year, are presented in Table A.10. Regression

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<sup>12</sup> The regression equations do not express causal relationships. Rather, they imply only statistical associations. For this reason, predictors are often called “symptomatic indicators.” They are symptomatic of differences among states in conditions associated with having higher or lower participation rates.

estimates of participation rates for all eligible people and the working poor are in Table A.11, and the standard errors for the regression estimates are in Table A.12.

### 3. Using Shrinkage Methods, Average the Direct Sample Estimates and Regression Predictions to Obtain Preliminary Shrinkage Estimates of State SNAP Participation Rates

To average the direct sample estimates and the regression predictions, we used an empirical Bayes shrinkage estimator.<sup>13</sup> The estimator does not have a closed-form expression from which we can calculate shrinkage estimates. Instead, we must numerically integrate over six scalar parameters— $\sigma_1$ ,  $\sigma_2$ ,  $\rho$ ,  $\eta_1$ ,  $\eta_2$ , and  $\eta_{12}$ —that measure the lack of fit of the regression model and the correlations among regression prediction errors. To perform the numerical integration, we specified a grid of 8,072,064 equally-spaced points, starting with  $\sigma_1 = 0.001$ ,  $\sigma_2 = 0.001$ ,  $\rho = -0.999$ ,  $\eta_1 = 0.000$ ,  $\eta_2 = 0.000$ , and  $\eta_{12} = -0.999$  and incrementing  $\sigma_1$ ,  $\sigma_2$ ,  $\rho$ ,  $\eta_1$ ,  $\eta_2$ , and  $\eta_{12}$  by 0.350, 0.600, 0.198, 0.600, 0.600, and 0.165, respectively, up to  $\sigma_1 = 5.251$ ,  $\sigma_2 = 7.801$ ,  $\rho = 0.981$ ,  $\eta_1 = 7.800$ ,  $\eta_2 = 10.200$ , and  $\eta_{12} = 0.981$ . For combination  $k$  of  $\sigma_1$ ,  $\sigma_2$ ,  $\rho$ ,  $\eta_1$ ,  $\eta_2$ , and  $\eta_{12}$  ( $k = 1, 2, \dots, 8072064$ ), we calculated a vector of shrinkage estimates:

$$(23) \quad \theta_k = (\Sigma_k^{-1} + V^{-1})^{-1} (\Sigma_k^{-1} X \hat{B}_k + V^{-1} Y),$$

a variance-covariance matrix:

$$(24) \quad U_k = (\Sigma_k^{-1} + V^{-1})^{-1} + (\Sigma_k^{-1} + V^{-1})^{-1} \Sigma_k^{-1} X (X' (\Sigma_k + V)^{-1} X)^{-1} X' \Sigma_k^{-1} (\Sigma_k^{-1} + V^{-1})^{-1},$$

and a probability:

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<sup>13</sup> Although our shrinkage estimator averages direct sample and regression estimates, a state's shrinkage estimate for either all eligible people or the working poor in a given year does not have to be between the direct sample and regression estimates for the group and year in question. It may be above both of those estimates if, for example, they seem too low based on data from other years. In most cases, the shrinkage estimates presented in this report are between the direct sample and regression estimates. In the remaining cases, the shrinkage estimate is usually close to either the sample or regression estimate, and it is often close to both because the sample and regression estimates are close to each other.

$$(25) \quad p_k^* = (\Sigma_k + V)^{1/2} X' (\Sigma_k + V)^{-1} X^{1/2} \exp \left( -\frac{1}{2} (Y - X\hat{B}_k)' (\Sigma_k + V)^{-1} (Y - X\hat{B}_k) \right).$$

In these expressions,  $Y$  is a column vector of direct sample estimates (from Step 1) with 306 elements, six sample estimates for each of the 51 states. The first six elements of  $Y$  pertain to the first state, the next six to the second state, and so forth. For a given state, the first two elements are the 2006 sample estimates for all eligible people and the working poor, respectively; the second two elements are the 2007 estimates; and the final two elements are the 2008 estimates. The vector of shrinkage estimates,  $\theta_k$ , has the same structure as the vector of sample estimates,  $Y$ .  $V$  is the  $(306 \times 306)$  variance-covariance matrix for the sample estimates. Because state samples are independent in the CPS,  $V$  is block-diagonal with 51  $(6 \times 6)$  blocks. We described under Step 1 how we derived estimates for the elements of  $V$ .  $X$  is a  $(306 \times 48)$  matrix containing values for each of the seven predictors (plus an intercept) for every state, every year (2006, 2007 and 2008), and both groups (all eligible people and the working poor). The first six rows of  $X$  pertain to the first state, the next six rows pertain to the second state, and so forth. The six rows for state  $i$  are given by:

$$(26) \quad X_i = \begin{pmatrix} x'_{i11} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} \\ \underline{0} & x'_{i12} & \underline{0} & \underline{0} & \underline{0} & \underline{0} \\ \underline{0} & \underline{0} & x'_{i21} & \underline{0} & \underline{0} & \underline{0} \\ \underline{0} & \underline{0} & \underline{0} & x'_{i22} & \underline{0} & \underline{0} \\ \underline{0} & \underline{0} & \underline{0} & \underline{0} & x'_{i31} & \underline{0} \\ \underline{0} & \underline{0} & \underline{0} & \underline{0} & \underline{0} & x'_{i32} \end{pmatrix},$$

where  $x'_{it1}$  is a row vector for year  $t$  ( $t = 1$  for 2006,  $t = 2$  for 2007, and  $t = 3$  for 2008) with eight elements (an intercept plus the seven predictors listed under Step 2) to predict participation rates for all eligible people.  $x'_{it2}$  is a row vector for year  $t$  with eight elements to predict participation rates for the working poor.  $\underline{0}$  is a row vector with eight zeros. In a given year, the values of the predictors are

the same for the equations for all eligible people and for the working poor. Thus,  $x'_{it1} = x'_{it2} \cdot \hat{B}_k$  is a  $(48 \times 1)$  vector of regression coefficients, and is given by:

$$(27) \quad \hat{B}_k = (X'(\Sigma_k + V)^{-1}X)^{-1}X'(\Sigma_k + V)^{-1}Y.$$

Finally,  $\Sigma_k$  is a block-diagonal matrix with 51  $(6 \times 6)$  blocks, and every block equals:

$$(28) \quad \Sigma_k^* = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \otimes \begin{pmatrix} \sigma_{1,k}^2 & \sigma_{1,k}\sigma_{2,k}\rho_k \\ \sigma_{1,k}\sigma_{2,k}\rho_k & \sigma_{2,k}^2 \end{pmatrix} + \begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix} \otimes \begin{pmatrix} \eta_{1,k}^2 & \eta_{1,k}\eta_{2,k}\eta_{12,k} \\ \eta_{1,k}\eta_{2,k}\eta_{12,k} & \eta_{2,k}^2 \end{pmatrix}.$$

After calculating  $\theta_k$ ,  $U_k$ , and  $p_k^*$  8,072,064 times (once for each combination of  $\sigma_1$ ,  $\sigma_2$ ,  $\rho$ ,  $\eta_1$ ,  $\eta_2$ , and  $\eta_{12}$ ), we calculated the probability of  $(\sigma_{1,k}, \sigma_{2,k}, \rho_k, \eta_{1,k}, \eta_{2,k}, \eta_{12,k})$ :

$$(29) \quad p_k = \frac{p_k^*}{\sum_{k=1}^{8,072,064} p_k^*},$$

which is also an estimate of the probability that the shrinkage estimates  $\theta_k$  are the true values. As Equation (29) suggests, the  $p_k$  are obtained by normalizing the  $p_k^*$  to sum to one.

To complete the numerical integration over  $\sigma_1$ ,  $\sigma_2$ ,  $\rho$ ,  $\eta_1$ ,  $\eta_2$ , and  $\eta_{12}$  and obtain a single set of shrinkage estimates, we calculated a weighted sum of the 8,072,064 sets of shrinkage estimates, weighting each set  $\theta_k$  by its associated probability  $p_k$ . Thus, our shrinkage estimates are:

$$(30) \quad \theta = \sum_{k=1}^{8,072,064} p_k \theta_k.$$

We call these estimates “preliminary” because we make some fairly small adjustments to them in the next step to derive our “final” estimates. The variance-covariance matrix for our preliminary shrinkage estimates is:

$$(31) \quad U = \sum_{k=1}^{8,072,064} p_k U_k + \sum_{k=1}^{8,072,064} p_k (\theta_k - \theta)(\theta_k - \theta)'.$$

The first term on the right side of this expression reflects the error from sampling variability and the lack of fit of the regression model. The second term captures how the shrinkage estimates vary as  $\sigma_1$ ,  $\sigma_2$ ,  $\rho$ ,  $\eta_1$ ,  $\eta_2$ , and  $\eta_{12}$  vary. Thus, the second term accounts for the variability from not knowing and, thus, having to estimate  $\sigma_1$ ,  $\sigma_2$ ,  $\rho$ ,  $\eta_1$ ,  $\eta_2$ , and  $\eta_{12}$ . As described later, standard errors of the final shrinkage estimates for states are calculated as functions of the square roots of the diagonal elements of  $U$ .

Regression estimates can be similarly obtained. They are:

$$(32) \quad R = \sum_{k=1}^{8,072,064} p_k R_k ,$$

where  $R_k = X\hat{B}_k$  is the vector of regression estimates obtained when  $\sigma_1 = \sigma_{1,k}$ ;  $\sigma_2 = \sigma_{2,k}$ ;  $\rho = \rho_k$ ;  $\eta_1 = \eta_{1,k}$ ;  $\eta_2 = \eta_{2,k}$ ; and  $\eta_{12} = \eta_{12,k}$ . The variance-covariance matrix is:

$$(33) \quad G = \sum_{k=1}^{8,072,064} p_k G_k + \sum_{k=1}^{8,072,064} p_k (R_k - R)(R_k - R)' ,$$

where  $G_k = X(X'(\Sigma_k + V)^{-1}X)^{-1}X' + \Sigma_k$ . We can estimate the regression coefficient vector by:

$$(34) \quad \hat{B} = \sum_{k=1}^{8,072,064} p_k \hat{B}_k .$$

Regression estimates of participation rates for all eligible people and the working poor were presented before in Table A.11. Preliminary shrinkage estimates of SNAP participation rates are displayed in Table A.13.

#### 4. Adjust the Preliminary Shrinkage Estimates to Obtain Final Shrinkage Estimates of State SNAP Participation Rates

We adjusted the preliminary shrinkage estimates of participation rates so that the eligibles counts implied by the rates sum to the national eligibles counts estimated directly from the CPS. This adjustment was carried out for each year and each group separately. The following description of the adjustment will focus on the 2008 estimates for all eligible people.

To implement the adjustment, we calculated preliminary estimates of counts for all eligible people according to:

$$(35) \quad \psi_{1,i} = \frac{P_i(\varepsilon_{1,i}/100)}{(\theta_{1,i}/100)},$$

where  $\psi_{1,i}$  is the preliminary count of all eligible people for state  $i$ ,  $P_i$  and  $\varepsilon_{1,i}$  are the participant count and correctly-eligible rate (100 minus the payment error rate) figures used in Equation (1), and  $\theta_{1,i}$  is the preliminary participation rate derived in Equation (30). The state eligibles counts from Equation (35) summed to 41,704,201 for 2008, while the national total for 2008 estimated directly from the CPS was 41,055,094. To obtain estimated eligibles counts for states that sum (aside from rounding error) to the direct estimate of the national total, we multiplied each of the eligibles counts from Equation (35) by  $41,055,094 \div 41,704,201$  ( $\approx 0.9844$ ).<sup>14</sup>

Our final shrinkage estimates of the numbers of people eligible for SNAP were shown earlier in Table III.2 of Chapter III. From those final shrinkage estimates of the numbers of eligible people, we calculated final shrinkage estimates of participation rates according to:

$$(36) \quad \theta_{F,1,i} = 100 \frac{P_i(\varepsilon_{1,i}/100)}{\psi_{F,1,i}},$$

where  $\theta_{F,1,i}$  is the final shrinkage estimate of the participation rate for all eligible people in state  $i$ , and  $\psi_{F,1,i}$  is the final shrinkage estimate of the number of all eligible people.  $P_i$  and  $\varepsilon_{1,i}$  are the participant count and correctly-eligible rate figures used in Equations (1) and (35). Participation rates for all states and all eligible people were shown in Chapter III, Table III.1. We derived final participation rates for the working poor in the same way. Our final estimates of the number of eligible working

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<sup>14</sup> The adjustment factors for 2006 and 2007 for all eligible people were, respectively, 0.9872, and 0.9842. The direct estimates of the national totals for all eligibles for those years were 37,417,632 and 38,921,885. The adjustment factors for 2006, 2007, and 2008 for working poor eligibles were, respectively, 0.9718, 0.9795 and 0.9734. The direct estimates of the national totals for working poor eligibles for those years were 17,907,063, 18,671,402, and 19,685,388.



poor people were shown in Chapter III, Table III.2, and the final participation rates were shown in Chapter III, Table III.1.

In Tables III.3 to III.5 of Chapter III, we reported approximate 90-percent confidence intervals for our final shrinkage estimates for all eligible people. In Tables III.6 to III.8 we reported the confidence intervals for the final shrinkage estimates for the working poor. The upper and lower bounds of the confidence intervals were calculated according to:

$$(37) \text{ Upper Bound}_i = F_i + 1.645 e_i$$

and:

$$(38) \text{ Lower Bound}_i = F_i - 1.645 e_i ,$$

where  $F_i$  is the final shrinkage estimate for state  $i$  and  $e_i$  is the standard error of that estimate. For participation rates and eligibles counts, the standard errors are, respectively:

$$(39) \quad e_i = \frac{1}{r} \sqrt{U(6i-1, 6i-1)}$$

and

$$(40) \quad e_i = \frac{\psi_{F,1,i}}{\theta_{F,1,i}} \frac{1}{r} \sqrt{U(6i-1, 6i-1)} ,$$

where  $r$  is the ratio used to adjust preliminary estimates of state eligibles counts to the direct estimate of the national total ( $\approx 0.9844$  for all eligible people for 2008), and  $U(6i-1, 6i-1)$  is the  $(6i-1, 6i-1)$  diagonal element of  $U$ , which was derived according to Equation (31).<sup>15</sup> Our estimate of  $e_i$  does not take account of the correlation between  $r$  and our preliminary shrinkage estimates for states, which were summed to obtain the denominator of  $r$ . Instead,  $r$  is treated as a constant.

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<sup>15</sup> The square root of  $U(6i-1, 6i-1)$  is the standard error of the preliminary shrinkage estimate of the 2008 participation rate for all eligible people for state  $i$ . When deriving estimates for 2006 and 2007, we would use the  $(6i-5, 6i-5)$  and  $(6i-3, 6i-3)$  diagonal elements of  $U$ , respectively. When deriving estimates for the working poor for 2006, 2007, and 2008, we would use the  $(6i-4, 6i-4)$ ,  $(6i-2, 6i-2)$ , and  $(6i, 6i)$  diagonal elements of  $U$ , respectively.

Table A.14 presents final shrinkage estimates of participation rates for all eligible people (values of  $\theta_{F,1,i}$ ) and the working poor (values of  $\theta_{F,2,i}$ ) and Table A.15 presents standard errors for the rates. Tables A.16 and A.17 display final shrinkage estimates of the numbers of all eligible people (values of  $\psi_{F,1,i}$ ) and eligible working poor (values of  $\psi_{F,2,i}$ ), respectively, and Tables A.18 and A.19 present the standard errors for those estimated counts.<sup>16</sup> Finally, Tables A.20 and A.21 show payment-error-adjusted numbers of, respectively, all people receiving SNAP benefits under normal program eligibility rules (values of  $P_i(\mathcal{E}_{1,i}/100)$ ) and the working poor receiving SNAP benefits under normal program eligibility rules (values of  $P_i(\mathcal{E}_{2,i}/100)$ ).

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<sup>16</sup> The rates and counts for all eligible people in Tables A.14 and A.16 are the same as the rates and counts in Tables III.1 and III.2 of Chapter III, except for the number of digits displayed. Likewise, the rates and counts for the working poor in Tables A.14 and A.17 are the same as the rates and counts in Tables III.1 and III.2 of Chapter III, except for the number of digits displayed.

Table A.1. Direct Sample Estimates of SNAP Participation Rates

|                      | Direct Sample Estimates of SNAP Participation Rates (Percent) |        |        |              |        |         |
|----------------------|---|--------|--------|--------------|--------|---------|
|                      | All Eligible People   |        |        | Working Poor |        |         |
|                      | 2006  | 2007   | 2008   | 2006         | 2007   | 2008    |
| Alabama              | 70.395  | 74.030 | 69.305 | 58.291       | 74.380 | 59.182  |
| Alaska               | 62.381  | 71.053 | 62.846 | 59.207       | 67.644 | 66.690  |
| Arizona              | 61.232  | 63.071 | 54.895 | 61.262       | 53.556 | 50.045  |
| Arkansas             | 71.231  | 82.383 | 74.769 | 59.847       | 80.391 | 72.843  |
| California           | 49.857  | 48.653 | 50.174 | 35.472       | 33.187 | 30.832  |
| Colorado             | 55.433  | 54.770 | 49.527 | 40.163       | 48.460 | 39.117  |
| Connecticut          | 75.089  | 61.308 | 63.020 | 59.998       | 43.476 | 45.500  |
| Delaware             | 76.667  | 63.567 | 67.342 | 79.735       | 51.505 | 60.780  |
| District of Columbia | 89.754  | 80.619 | 87.814 | 37.037       | 35.724 | 36.669  |
| Florida              | 59.173  | 54.777 | 59.552 | 47.160       | 45.037 | 42.404  |
| Georgia              | 69.247  | 63.318 | 67.796 | 60.017       | 55.340 | 56.343  |
| Hawaii               | 74.368  | 82.841 | 76.891 | 52.779       | 67.412 | 57.626  |
| Idaho                | 60.260  | 52.074 | 49.751 | 55.174       | 54.729 | 48.900  |
| Illinois             | 82.953  | 86.260 | 80.129 | 71.334       | 68.050 | 64.383  |
| Indiana              | 75.754  | 73.497 | 65.651 | 83.388       | 73.162 | 61.654  |
| Iowa                 | 71.331  | 83.876 | 88.820 | 63.602       | 90.840 | 75.100  |
| Kansas               | 53.324  | 53.598 | 49.157 | 47.809       | 42.690 | 37.863  |
| Kentucky             | 76.746  | 77.380 | 80.330 | 66.220       | 74.189 | 61.056  |
| Louisiana            | 79.509  | 77.492 | 66.234 | 75.333       | 80.157 | 57.737  |
| Maine                | 103.770   | 92.583 | 94.572 | 115.394      | 94.942 | 87.346  |
| Maryland             | 60.231  | 61.741 | 60.912 | 46.829       | 48.453 | 43.526  |
| Massachusetts        | 54.336  | 58.510 | 64.048 | 29.554       | 41.742 | 43.006  |
| Michigan             | 77.480  | 88.999 | 82.877 | 77.329       | 87.607 | 85.679  |
| Minnesota            | 66.471  | 66.182 | 57.825 | 43.663       | 53.406 | 39.978  |
| Mississippi          | 59.048  | 59.233 | 65.076 | 54.351       | 52.587 | 59.706  |
| Missouri             | 90.267  | 81.527 | 87.845 | 84.059       | 69.773 | 84.238  |
| Montana              | 63.003  | 61.781 | 67.139 | 69.051       | 63.657 | 66.084  |
| Nebraska             | 70.837  | 73.842 | 63.583 | 56.367       | 72.727 | 57.155  |
| Nevada               | 51.669  | 47.861 | 51.226 | 41.182       | 34.227 | 38.338  |
| New Hampshire        | 61.724  | 66.571 | 64.450 | 50.483       | 50.830 | 54.739  |
| New Jersey           | 53.305  | 49.989 | 51.181 | 39.632       | 46.684 | 41.488  |
| New Mexico           | 72.780  | 76.239 | 67.758 | 73.245       | 72.537 | 68.350  |
| New York             | 63.103  | 58.477 | 66.285 | 52.659       | 48.290 | 49.863  |
| North Carolina       | 63.419  | 60.300 | 67.835 | 50.819       | 56.241 | 67.291  |
| North Dakota         | 55.731  | 62.369 | 64.026 | 55.446       | 53.789 | 60.086  |
| Ohio                 | 67.460  | 65.123 | 67.589 | 63.008       | 54.394 | 65.885  |
| Oklahoma             | 65.699  | 70.899 | 72.975 | 54.222       | 62.739 | 60.688  |
| Oregon               | 89.218  | 93.931 | 99.236 | 76.336       | 91.889 | 84.523  |
| Pennsylvania         | 75.048  | 78.814 | 80.277 | 68.462       | 72.648 | 64.923  |
| Rhode Island         | 56.738  | 61.789 | 58.262 | 30.530       | 47.104 | 32.171  |
| South Carolina       | 82.342  | 73.507 | 75.205 | 69.027       | 55.178 | 78.893  |
| South Dakota         | 65.107  | 69.855 | 61.646 | 63.867       | 71.641 | 53.717  |
| Tennessee            | 87.169  | 76.271 | 76.442 | 68.654       | 57.910 | 56.969  |
| Texas                | 61.835  | 54.446 | 54.519 | 53.099       | 44.560 | 45.960  |
| Utah                 | 50.762  | 47.006 | 65.828 | 42.145       | 43.381 | 55.605  |
| Vermont              | 80.852  | 69.504 | 84.888 | 71.316       | 60.516 | 89.882  |
| Virginia             | 68.692  | 69.342 | 63.077 | 56.274       | 60.185 | 55.781  |
| Washington           | 87.530  | 79.034 | 88.220 | 69.311       | 55.523 | 81.271  |
| West Virginia        | 75.804  | 85.411 | 91.442 | 74.625       | 98.648 | 116.168 |
| Wisconsin            | 61.488  | 61.655 | 64.987 | 58.620       | 64.385 | 65.111  |
| Wyoming              | 56.054  | 43.138 | 43.820 | 51.582       | 41.226 | 52.997  |

Table A.2. Standard Errors of Direct Sample Estimates of SNAP Participation Rates

|                      | Standard Errors of Direct Sample Estimates of SNAP Participation Rates |       |        |              |        |        |
|----------------------|--|-------|--------|--------------|--------|--------|
|                      | All Eligible People  |       |        | Working Poor |        |        |
|                      | 2006   | 2007  | 2008   | 2006         | 2007   | 2008   |
| Alabama              | 6.259  | 5.708 | 5.688  | 7.259        | 9.223  | 7.513  |
| Alaska               | 7.109  | 5.571 | 5.282  | 9.991        | 10.579 | 9.959  |
| Arizona              | 4.773  | 4.757 | 3.731  | 7.148        | 6.975  | 6.113  |
| Arkansas             | 4.693  | 8.584 | 7.169  | 6.036        | 14.471 | 9.232  |
| California           | 1.799  | 1.567 | 1.552  | 3.069        | 2.727  | 2.456  |
| Colorado             | 6.098  | 4.241 | 3.676  | 6.770        | 6.081  | 5.171  |
| Connecticut          | 6.264  | 5.583 | 4.263  | 9.449        | 7.650  | 6.316  |
| Delaware             | 6.390  | 5.417 | 6.345  | 11.760       | 9.050  | 9.172  |
| District of Columbia | 7.222  | 5.063 | 6.219  | 8.428        | 8.672  | 8.195  |
| Florida              | 2.892  | 3.148 | 3.365  | 4.859        | 5.304  | 4.876  |
| Georgia              | 4.099  | 3.674 | 4.012  | 6.953        | 5.679  | 6.226  |
| Hawaii               | 7.581  | 7.690 | 7.497  | 7.949        | 10.546 | 9.246  |
| Idaho                | 7.257  | 7.326 | 6.031  | 10.373       | 10.185 | 7.940  |
| Illinois             | 4.368  | 4.699 | 4.319  | 8.114        | 7.382  | 6.678  |
| Indiana              | 7.712  | 5.397 | 4.739  | 10.557       | 8.728  | 6.756  |
| Iowa                 | 6.227  | 6.670 | 5.278  | 7.949        | 11.866 | 8.661  |
| Kansas               | 4.984  | 4.205 | 4.841  | 6.107        | 4.688  | 5.344  |
| Kentucky             | 7.255  | 5.208 | 6.511  | 10.097       | 10.022 | 8.318  |
| Louisiana            | 7.677  | 4.622 | 5.013  | 13.589       | 9.543  | 6.909  |
| Maine                | 9.195  | 6.685 | 6.512  | 16.880       | 12.809 | 11.140 |
| Maryland             | 4.927  | 4.620 | 4.010  | 7.834        | 7.110  | 5.969  |
| Massachusetts        | 4.747  | 4.578 | 5.610  | 5.459        | 8.291  | 7.643  |
| Michigan             | 4.622  | 5.915 | 5.228  | 8.465        | 10.458 | 9.124  |
| Minnesota            | 5.472  | 6.321 | 6.874  | 6.209        | 8.288  | 10.221 |
| Mississippi          | 5.454  | 6.636 | 3.562  | 7.443        | 9.424  | 5.816  |
| Missouri             | 6.851  | 6.057 | 5.803  | 10.982       | 8.529  | 11.903 |
| Montana              | 8.102  | 6.971 | 6.506  | 10.050       | 10.149 | 12.584 |
| Nebraska             | 5.271  | 7.620 | 6.013  | 6.504        | 9.700  | 7.181  |
| Nevada               | 4.338  | 4.257 | 4.279  | 5.968        | 4.667  | 5.612  |
| New Hampshire        | 5.588  | 6.607 | 5.735  | 8.703        | 9.657  | 9.081  |
| New Jersey           | 3.807  | 4.149 | 4.536  | 6.336        | 7.510  | 6.801  |
| New Mexico           | 5.380  | 7.419 | 6.197  | 7.961        | 10.502 | 8.987  |
| New York             | 2.446  | 2.409 | 2.672  | 5.594        | 5.265  | 5.451  |
| North Carolina       | 4.266  | 3.797 | 3.881  | 6.107        | 5.978  | 6.721  |
| North Dakota         | 5.368  | 6.515 | 13.800 | 9.907        | 9.457  | 14.720 |
| Ohio                 | 4.885  | 4.367 | 3.479  | 7.822        | 5.691  | 6.735  |
| Oklahoma             | 4.610  | 5.882 | 5.123  | 7.225        | 8.209  | 6.464  |
| Oregon               | 6.028  | 7.634 | 8.183  | 10.452       | 13.736 | 12.442 |
| Pennsylvania         | 4.358  | 4.650 | 4.233  | 7.501        | 9.774  | 8.529  |
| Rhode Island         | 5.355  | 4.193 | 4.421  | 6.802        | 8.128  | 5.279  |
| South Carolina       | 5.925  | 3.802 | 4.995  | 9.472        | 6.517  | 11.199 |
| South Dakota         | 7.156  | 9.306 | 8.706  | 9.812        | 9.547  | 8.545  |
| Tennessee            | 7.546  | 6.988 | 5.278  | 10.195       | 8.126  | 7.198  |
| Texas                | 2.513  | 2.363 | 2.238  | 4.168        | 3.448  | 3.312  |
| Utah                 | 4.554  | 3.732 | 6.782  | 5.265        | 5.129  | 9.679  |
| Vermont              | 8.114  | 6.431 | 7.095  | 13.588       | 11.726 | 15.383 |
| Virginia             | 8.163  | 9.884 | 6.957  | 10.127       | 11.854 | 9.562  |
| Washington           | 6.296  | 5.834 | 6.686  | 10.412       | 8.648  | 13.227 |
| West Virginia        | 4.681  | 6.741 | 6.160  | 9.877        | 14.078 | 17.426 |
| Wisconsin            | 4.789  | 6.021 | 4.856  | 8.238        | 9.472  | 8.781  |
| Wyoming              | 11.265   | 4.771 | 4.973  | 13.006       | 7.365  | 8.438  |

Table A.3. Number of People Receiving SNAP Benefits, Monthly Average

|                      | Number of People Receiving SNAP Benefits |           |           |
|----------------------|--|-----------|-----------|
|                      | 2006                                     | 2007      | 2008      |
| Alabama              | 538,680                                  | 545,955   | 571,591   |
| Alaska               | 57,153                                   | 56,181    | 56,977    |
| Arizona              | 540,782                                  | 544,688   | 627,660   |
| Arkansas             | 380,120                                  | 379,768   | 377,082   |
| California           | 1,999,656                                | 2,048,185 | 2,217,782 |
| Colorado             | 251,385                                  | 250,704   | 252,914   |
| Connecticut          | 210,288                                  | 212,562   | 225,383   |
| Delaware             | 65,698                                   | 67,185    | 74,429    |
| District of Columbia | 89,168                                   | 86,519    | 89,442    |
| Florida              | 1,232,949                                | 1,232,803 | 1,454,928 |
| Georgia              | 936,342                                  | 950,038   | 1,021,155 |
| Hawaii               | 87,942                                   | 89,629    | 96,551    |
| Idaho                | 91,106                                   | 87,068    | 100,198   |
| Illinois             | 1,225,093                                | 1,246,400 | 1,299,404 |
| Indiana              | 574,696                                  | 587,156   | 619,684   |
| Iowa                 | 225,717                                  | 238,349   | 255,789   |
| Kansas               | 183,071                                  | 182,407   | 187,569   |
| Kentucky             | 589,102                                  | 602,022   | 633,194   |
| Louisiana            | 673,550                                  | 650,357   | 662,735   |
| Maine                | 160,294                                  | 162,602   | 173,039   |
| Maryland             | 305,395                                  | 317,825   | 359,985   |
| Massachusetts        | 431,518                                  | 456,192   | 505,782   |
| Michigan             | 1,133,793                                | 1,204,409 | 1,256,373 |
| Minnesota            | 263,986                                  | 276,414   | 293,918   |
| Mississippi          | 407,482                                  | 426,116   | 447,181   |
| Missouri             | 796,350                                  | 823,915   | 701,304   |
| Montana              | 81,567                                   | 79,969    | 80,407    |
| Nebraska             | 119,683                                  | 120,634   | 120,773   |
| Nevada               | 117,920                                  | 122,224   | 144,494   |
| New Hampshire        | 56,338                                   | 59,101    | 63,583    |
| New Jersey           | 405,667                                  | 414,503   | 437,860   |
| New Mexico           | 244,672                                  | 233,918   | 239,959   |
| New York             | 1,785,914                                | 1,801,984 | 1,952,991 |
| North Carolina       | 854,407                                  | 882,946   | 946,978   |
| North Dakota         | 42,576                                   | 45,122    | 48,412    |
| Ohio                 | 1,063,920                                | 1,076,764 | 1,150,928 |
| Oklahoma             | 435,519                                  | 421,316   | 419,029   |
| Oregon               | 434,239                                  | 438,498   | 469,018   |
| Pennsylvania         | 1,092,298                                | 1,135,146 | 1,187,822 |
| Rhode Island         | 73,195                                   | 76,315    | 84,868    |
| South Carolina       | 534,294                                  | 545,293   | 589,763   |
| South Dakota         | 58,466                                   | 60,246    | 62,945    |
| Tennessee            | 863,745                                  | 864,870   | 911,253   |
| Texas                | 2,575,076                                | 2,422,198 | 2,515,558 |
| Utah                 | 131,753                                  | 123,475   | 134,180   |
| Vermont              | 47,202                                   | 49,865    | 55,847    |
| Virginia             | 506,656                                  | 515,032   | 545,079   |
| Washington           | 535,768                                  | 536,333   | 578,561   |
| West Virginia        | 267,630                                  | 269,343   | 276,800   |
| Wisconsin            | 367,918                                  | 382,770   | 421,611   |
| Wyoming              | 24,236                                   | 22,608    | 22,608    |

Source: USDA, Food and Nutrition Service

Table A.4. Population on July 1

|                      | Population on July 1(T) |            |            |
|----------------------|-------------------------|------------|------------|
|                      | 2006                    | 2007       | 2008       |
| Alabama              | 4,597,688               | 4,637,904  | 4,677,464  |
| Alaska               | 677,325                 | 682,297    | 688,125    |
| Arizona              | 6,192,100               | 6,362,241  | 6,499,377  |
| Arkansas             | 2,815,097               | 2,842,194  | 2,867,764  |
| California           | 35,979,208              | 36,226,122 | 36,580,371 |
| Colorado             | 4,753,044               | 4,842,259  | 4,935,213  |
| Connecticut          | 3,485,162               | 3,488,633  | 3,502,932  |
| Delaware             | 853,022                 | 864,896    | 876,211    |
| District of Columbia | 583,978                 | 586,409    | 590,074    |
| Florida              | 18,088,505              | 18,277,888 | 18,423,878 |
| Georgia              | 9,330,086               | 9,533,761  | 9,697,838  |
| Hawaii               | 1,275,599               | 1,276,832  | 1,287,481  |
| Idaho                | 1,464,413               | 1,499,245  | 1,527,506  |
| Illinois             | 12,718,011              | 12,779,417 | 12,842,954 |
| Indiana              | 6,301,700               | 6,346,113  | 6,388,309  |
| Iowa                 | 2,964,391               | 2,978,719  | 2,993,987  |
| Kansas               | 2,755,700               | 2,775,586  | 2,797,375  |
| Kentucky             | 4,219,374               | 4,256,278  | 4,287,931  |
| Louisiana            | 4,240,327               | 4,376,122  | 4,451,513  |
| Maine                | 1,314,963               | 1,317,308  | 1,319,691  |
| Maryland             | 5,612,196               | 5,634,242  | 5,658,655  |
| Massachusetts        | 6,466,399               | 6,499,275  | 6,543,595  |
| Michigan             | 10,082,438              | 10,050,847 | 10,002,486 |
| Minnesota            | 5,148,346               | 5,191,206  | 5,230,567  |
| Mississippi          | 2,897,150               | 2,921,723  | 2,940,212  |
| Missouri             | 5,861,572               | 5,909,824  | 5,956,335  |
| Montana              | 946,230                 | 957,225    | 968,035    |
| Nebraska             | 1,760,435               | 1,769,912  | 1,781,949  |
| Nevada               | 2,493,405               | 2,567,752  | 2,615,772  |
| New Hampshire        | 1,311,894               | 1,317,343  | 1,321,872  |
| New Jersey           | 8,623,721               | 8,636,043  | 8,663,398  |
| New Mexico           | 1,942,608               | 1,968,731  | 1,986,763  |
| New York             | 19,356,564              | 19,422,777 | 19,467,789 |
| North Carolina       | 8,866,977               | 9,064,074  | 9,247,134  |
| North Dakota         | 636,771                 | 638,202    | 641,421    |
| Ohio                 | 11,492,495              | 11,520,815 | 11,528,072 |
| Oklahoma             | 3,574,334               | 3,612,186  | 3,644,025  |
| Oregon               | 3,677,545               | 3,732,957  | 3,782,991  |
| Pennsylvania         | 12,471,142              | 12,522,531 | 12,566,368 |
| Rhode Island         | 1,060,196               | 1,055,009  | 1,053,502  |
| South Carolina       | 4,339,399               | 4,424,232  | 4,503,280  |
| South Dakota         | 788,519                 | 797,035    | 804,532    |
| Tennessee            | 6,089,453               | 6,172,862  | 6,240,456  |
| Texas                | 23,369,024              | 23,837,701 | 24,304,290 |
| Utah                 | 2,583,724               | 2,663,796  | 2,727,343  |
| Vermont              | 619,985                 | 620,460    | 621,049    |
| Virginia             | 7,646,996               | 7,719,749  | 7,795,424  |
| Washington           | 6,372,243               | 6,464,979  | 6,566,073  |
| West Virginia        | 1,807,237               | 1,811,198  | 1,814,873  |
| Wisconsin            | 5,571,680               | 5,601,571  | 5,627,610  |
| Wyoming              | 512,841                 | 523,414    | 532,981    |

Source: U.S. Census Bureau, Population Division

Table A.5. Percentage of Participants Who Are Income Eligible and Correctly Receiving Benefits

|                      | Percentage of Participants Who Are Income Eligible and Correctly Receiving Benefits |        |        |              |        |        |
|----------------------|---|--------|--------|--------------|--------|--------|
|                      | All Eligible People   |        |        | Working Poor |        |        |
|                      | 2006  | 2007   | 2008   | 2006         | 2007   | 2008   |
| Alabama              | 98.723  | 98.137 | 98.752 | 37.019       | 39.766 | 38.300 |
| Alaska               | 95.761  | 97.421 | 95.726 | 43.808       | 42.904 | 45.536 |
| Arizona              | 96.105  | 97.567 | 94.148 | 48.534       | 44.041 | 44.409 |
| Arkansas             | 97.185  | 97.376 | 98.044 | 42.230       | 42.853 | 41.947 |
| California           | 98.880  | 98.600 | 99.012 | 39.238       | 40.166 | 36.763 |
| Colorado             | 97.523  | 97.907 | 98.771 | 34.886       | 40.786 | 40.232 |
| Connecticut          | 96.860  | 95.662 | 95.731 | 27.622       | 28.986 | 28.490 |
| Delaware             | 90.461  | 90.047 | 90.060 | 41.148       | 36.160 | 41.039 |
| District of Columbia | 95.745  | 96.186 | 96.225 | 14.331       | 14.115 | 12.606 |
| Florida              | 95.972  | 98.012 | 99.616 | 35.833       | 36.559 | 32.661 |
| Georgia              | 97.214  | 95.765 | 98.728 | 44.032       | 45.123 | 44.584 |
| Hawaii               | 99.081  | 98.537 | 98.599 | 41.130       | 42.967 | 40.828 |
| Idaho                | 97.775  | 97.769 | 98.219 | 50.241       | 52.258 | 52.605 |
| Illinois             | 97.815  | 98.490 | 98.722 | 37.673       | 36.646 | 38.410 |
| Indiana              | 97.610  | 96.645 | 97.696 | 42.050       | 42.643 | 38.730 |
| Iowa                 | 97.267  | 96.828 | 95.732 | 45.652       | 49.900 | 44.658 |
| Kansas               | 96.843  | 98.877 | 97.073 | 45.537       | 46.434 | 46.173 |
| Kentucky             | 97.615  | 98.181 | 97.686 | 36.195       | 35.545 | 27.903 |
| Louisiana            | 92.785  | 96.649 | 97.062 | 39.542       | 42.945 | 40.605 |
| Maine                | 93.212  | 90.016 | 91.403 | 35.382       | 34.211 | 33.189 |
| Maryland             | 94.134  | 92.895 | 93.750 | 33.170       | 33.167 | 30.801 |
| Massachusetts        | 95.619  | 94.102 | 94.228 | 21.294       | 19.478 | 23.329 |
| Michigan             | 91.026  | 93.579 | 91.886 | 39.075       | 40.875 | 41.126 |
| Minnesota            | 96.639  | 96.904 | 96.661 | 31.201       | 36.247 | 37.722 |
| Mississippi          | 99.241  | 98.829 | 99.286 | 40.446       | 43.059 | 39.670 |
| Missouri             | 98.663  | 98.647 | 98.099 | 43.924       | 39.854 | 43.256 |
| Montana              | 95.649  | 96.909 | 98.051 | 43.912       | 45.248 | 41.210 |
| Nebraska             | 98.351  | 98.908 | 99.334 | 43.078       | 46.856 | 49.526 |
| Nevada               | 98.530  | 98.304 | 98.057 | 39.533       | 38.514 | 37.529 |
| New Hampshire        | 97.795  | 96.134 | 97.225 | 34.624       | 33.213 | 34.384 |
| New Jersey           | 97.864  | 98.407 | 97.721 | 33.456       | 32.744 | 29.360 |
| New Mexico           | 97.365  | 97.609 | 97.940 | 49.606       | 49.268 | 50.279 |
| New York             | 98.138  | 97.926 | 97.396 | 33.895       | 35.719 | 31.793 |
| North Carolina       | 98.547  | 99.246 | 99.240 | 37.414       | 44.929 | 42.844 |
| North Dakota         | 93.996  | 94.254 | 93.184 | 42.578       | 45.171 | 45.411 |
| Ohio                 | 96.583  | 96.437 | 98.897 | 38.663       | 37.173 | 36.141 |
| Oklahoma             | 96.818  | 96.642 | 97.121 | 41.719       | 39.658 | 38.614 |
| Oregon               | 88.980  | 91.873 | 89.631 | 34.400       | 40.882 | 36.622 |
| Pennsylvania         | 97.912  | 98.138 | 98.779 | 35.583       | 34.660 | 32.985 |
| Rhode Island         | 97.995  | 98.335 | 98.248 | 18.815       | 26.241 | 23.556 |
| South Carolina       | 97.508  | 97.917 | 97.855 | 41.047       | 35.545 | 38.696 |
| South Dakota         | 98.962  | 98.665 | 99.510 | 49.835       | 49.432 | 44.563 |
| Tennessee            | 97.375  | 97.696 | 97.576 | 35.195       | 31.314 | 36.754 |
| Texas                | 94.078  | 94.579 | 95.736 | 45.457       | 43.651 | 44.542 |
| Utah                 | 97.685  | 98.149 | 97.205 | 46.909       | 49.389 | 46.308 |
| Vermont              | 94.964  | 94.288 | 93.951 | 34.698       | 33.256 | 39.947 |
| Virginia             | 97.033  | 97.437 | 97.790 | 37.350       | 39.264 | 39.594 |
| Washington           | 97.984  | 97.684 | 97.491 | 37.864       | 32.463 | 34.153 |
| West Virginia        | 95.921  | 96.848 | 97.261 | 36.056       | 37.083 | 37.096 |
| Wisconsin            | 90.207  | 92.477 | 90.210 | 40.712       | 45.026 | 45.653 |
| Wyoming              | 98.281  | 95.971 | 98.742 | 48.039       | 45.665 | 47.719 |

Table A.6. Direct Sample Estimates of Percentage of People Eligible for SNAP

|                      | Direct Sample Estimates of Percentage of People Eligible for SNAP |        |        |              |        |        |
|----------------------|---|--------|--------|--------------|--------|--------|
|                      | All Eligible People   |        |        | Working Poor |        |        |
|                      | 2006  | 2007   | 2008   | 2006         | 2007   | 2008   |
| Alabama              | 16.431  | 15.605 | 17.412 | 7.441        | 6.294  | 7.908  |
| Alaska               | 12.953  | 11.290 | 12.612 | 6.243        | 5.223  | 5.654  |
| Arizona              | 13.707  | 13.244 | 16.563 | 6.919        | 7.040  | 8.570  |
| Arkansas             | 18.423  | 15.794 | 17.242 | 9.528        | 7.123  | 7.572  |
| California           | 11.023  | 11.458 | 11.964 | 6.148        | 6.843  | 7.229  |
| Colorado             | 9.305   | 9.255  | 10.220 | 4.594        | 4.358  | 5.271  |
| Connecticut          | 7.783   | 9.507  | 9.774  | 2.778        | 4.062  | 4.029  |
| Delaware             | 9.088   | 11.004 | 11.360 | 3.975        | 5.454  | 5.736  |
| District of Columbia | 16.288  | 17.603 | 16.610 | 5.908        | 5.829  | 5.211  |
| Florida              | 11.055  | 12.068 | 13.210 | 5.179        | 5.475  | 6.083  |
| Georgia              | 14.089  | 15.072 | 15.334 | 7.363        | 8.125  | 8.332  |
| Hawaii               | 9.185   | 8.350  | 9.616  | 5.373        | 4.474  | 5.313  |
| Idaho                | 10.094  | 10.904 | 12.950 | 5.665        | 5.545  | 7.057  |
| Illinois             | 11.359  | 11.136 | 12.465 | 5.087        | 5.252  | 6.036  |
| Indiana              | 11.751  | 12.166 | 14.435 | 4.599        | 5.393  | 6.094  |
| Iowa                 | 10.383  | 9.237  | 9.208  | 5.465        | 4.396  | 5.080  |
| Kansas               | 12.065  | 12.124 | 13.241 | 6.328        | 7.148  | 8.177  |
| Kentucky             | 17.758  | 17.947 | 17.958 | 7.631        | 6.777  | 6.749  |
| Louisiana            | 18.537  | 18.536 | 21.817 | 8.338        | 7.962  | 10.470 |
| Maine                | 10.950  | 12.001 | 12.673 | 3.738        | 4.448  | 4.982  |
| Maryland             | 8.505   | 8.487  | 9.791  | 3.854        | 3.861  | 4.502  |
| Massachusetts        | 11.743  | 11.289 | 11.372 | 4.808        | 3.275  | 4.193  |
| Michigan             | 13.211  | 12.600 | 13.926 | 5.682        | 5.591  | 6.029  |
| Minnesota            | 7.455   | 7.796  | 9.393  | 3.664        | 3.614  | 5.302  |
| Mississippi          | 23.639  | 24.334 | 23.205 | 10.467       | 11.942 | 10.105 |
| Missouri             | 12.547  | 13.746 | 13.148 | 5.999        | 6.489  | 6.046  |
| Montana              | 13.087  | 13.105 | 12.131 | 5.482        | 5.938  | 5.180  |
| Nebraska             | 9.439   | 9.130  | 10.588 | 5.196        | 4.391  | 5.873  |
| Nevada               | 9.019   | 9.777  | 10.574 | 4.540        | 5.356  | 5.407  |
| New Hampshire        | 6.804   | 6.479  | 7.256  | 2.945        | 2.932  | 3.021  |
| New Jersey           | 8.636   | 9.449  | 9.650  | 3.971        | 3.367  | 3.577  |
| New Mexico           | 16.850  | 15.212 | 17.458 | 8.530        | 8.070  | 8.885  |
| New York             | 14.349  | 15.536 | 14.740 | 5.939        | 6.863  | 6.396  |
| North Carolina       | 14.973  | 16.033 | 14.982 | 7.094        | 7.782  | 6.520  |
| North Dakota         | 11.277  | 10.685 | 10.985 | 5.134        | 5.937  | 5.704  |
| Ohio                 | 13.254  | 13.840 | 14.608 | 5.681        | 6.387  | 5.477  |
| Oklahoma             | 17.956  | 15.899 | 15.304 | 9.375        | 7.373  | 7.317  |
| Oregon               | 11.776  | 11.489 | 11.198 | 5.321        | 5.226  | 5.372  |
| Pennsylvania         | 11.427  | 11.287 | 11.631 | 4.552        | 4.325  | 4.802  |
| Rhode Island         | 11.924  | 11.512 | 13.585 | 4.255        | 4.030  | 5.899  |
| South Carolina       | 14.580  | 16.418 | 17.041 | 7.322        | 7.940  | 6.424  |
| South Dakota         | 11.270  | 10.676 | 12.629 | 5.786        | 5.216  | 6.491  |
| Tennessee            | 15.845  | 17.947 | 18.640 | 7.272        | 7.576  | 9.421  |
| Texas                | 16.765  | 17.651 | 18.175 | 9.433        | 9.954  | 10.031 |
| Utah                 | 9.813   | 9.679  | 7.265  | 5.676        | 5.277  | 4.097  |
| Vermont              | 8.942   | 10.903 | 9.953  | 3.704        | 4.417  | 3.997  |
| Virginia             | 9.359   | 9.375  | 10.840 | 4.398        | 4.353  | 4.963  |
| Washington           | 9.412   | 10.254 | 9.737  | 4.593        | 4.850  | 3.703  |
| West Virginia        | 18.739  | 16.862 | 16.222 | 7.155        | 5.590  | 4.870  |
| Wisconsin            | 9.688   | 10.249 | 10.400 | 4.586        | 4.779  | 5.253  |
| Wyoming              | 8.286   | 9.610  | 9.558  | 4.401        | 4.784  | 3.819  |



Table A.7. Percentage of SNAP Participants in Households with Earners, by Indicator of Earnings, 2008

|                      | Percentage of SNAP Participants in Households with Earners |   |       |
|----------------------|--|---|-------|
|                      | Earned Income in Household                                 | No Earned Income, Other Indicator of Earnings | Total |
| Alabama              | 38.8   | 0.0   | 38.8  |
| Alaska               | 47.6   | 0.0   | 47.6  |
| Arizona              | 49.0   | 0.0   | 49.0  |
| Arkansas             | 41.9   | 0.9   | 42.8  |
| California           | 37.0   | 0.2   | 37.1  |
| Colorado             | 40.6   | 0.0   | 40.6  |
| Connecticut          | 29.7   | 0.1   | 29.8  |
| Delaware             | 49.1   | 0.4   | 49.5  |
| District of Columbia | 13.1   | 0.0   | 13.1  |
| Florida              | 32.7   | 0.1   | 32.8  |
| Georgia              | 45.1   | 0.1   | 45.2  |
| Hawaii               | 41.5   | 0.0   | 41.5  |
| Idaho                | 53.6   | 0.0   | 53.6  |
| Illinois             | 38.9   | 0.0   | 38.9  |
| Indiana              | 39.5   | 0.1   | 39.6  |
| Iowa                 | 46.7   | 0.0   | 46.7  |
| Kansas               | 46.9   | 0.6   | 47.6  |
| Kentucky             | 28.6   | 0.0   | 28.6  |
| Louisiana            | 41.8   | 0.0   | 41.8  |
| Maine                | 39.2   | 0.0   | 39.2  |
| Maryland             | 35.1   | 0.0   | 35.1  |
| Massachusetts        | 27.1   | 0.4   | 27.5  |
| Michigan             | 46.5   | 0.0   | 46.5  |
| Minnesota            | 38.9   | 0.5   | 39.4  |
| Mississippi          | 40.0   | 0.0   | 40.0  |
| Missouri             | 56.7   | 0.2   | 56.9  |
| Montana              | 41.6   | 0.5   | 42.0  |
| Nebraska             | 49.9   | 0.0   | 49.9  |
| Nevada               | 38.3   | 0.0   | 38.3  |
| New Hampshire        | 35.4   | 0.0   | 35.4  |
| New Jersey           | 29.6   | 0.5   | 30.1  |
| New Mexico           | 51.3   | 0.0   | 51.3  |
| New York             | 32.6   | 0.1   | 32.7  |
| North Carolina       | 42.8   | 0.3   | 43.2  |
| North Dakota         | 50.8   | 0.0   | 50.8  |
| Ohio                 | 36.6   | 0.0   | 36.6  |
| Oklahoma             | 39.8   | 0.0   | 39.8  |
| Oregon               | 44.2   | 0.0   | 44.2  |
| Pennsylvania         | 33.1   | 0.3   | 33.4  |
| Rhode Island         | 24.0   | 0.0   | 24.0  |
| South Carolina       | 39.3   | 0.2   | 39.5  |
| South Dakota         | 45.0   | 0.0   | 45.0  |
| Tennessee            | 37.7   | 0.0   | 37.7  |
| Texas                | 47.7   | 0.0   | 47.8  |
| Utah                 | 48.1   | 0.0   | 48.1  |
| Vermont              | 44.6   | 0.1   | 44.7  |
| Virginia             | 40.3   | 0.2   | 40.5  |
| Washington           | 35.1   | 0.0   | 35.1  |
| West Virginia        | 38.0   | 0.2   | 38.1  |
| Wisconsin            | 53.0   | 0.1   | 53.1  |
| Wyoming              | 47.6   | 0.7   | 48.3  |

Table A.8. Definitions and Data Sources for Predictors

| Predictor <sup>a</sup>               | Definition   | Principal Data Source <sup>b</sup>  |
|--------------------------------------|--|---|
| Income eligible SNAP prevalence rate | $100 \times \frac{\text{Income-eligible individuals correctly receiving SNAP benefits}}{\text{Resident population}}$   | Counts of people receiving SNAP benefits are from SNAP Program Operations data.   |
| Elderly combined poverty rate        | $100 \times \frac{\text{Individuals age 65 or older not claimed on tax returns or claimed on tax returns with adjusted gross income below the poverty level}}{\text{Resident population of people age 65 or older}}$ | All data for this predictor were obtained from the Census Bureau.   |
| Single mother household rate         | $100 \times \frac{\text{Female-headed households with no husband present and related children under 18 years}}{\text{Total households}}$   | The data for constructing these predictors were obtained from the 2006–2008 American Community Survey Three-Year Estimates available at <a href="http://factfinder.census.gov">http://factfinder.census.gov</a> . |
| Owner-occupied housing rate          | $100 \times \frac{\text{Owner-occupied housing units}}{\text{Occupied housing units}}$   |   |
| High rental housing cost rate        | $100 \times \frac{\text{Renter-occupied units spending 30 percent or more of household income on rent and utilities}}{\text{Renter-occupied housing units}}$   |   |
| <b>Bachelor's degree</b> rate        | $100 \times \frac{\text{Number of adults 25 years and over who have completed a bachelor's degree}}{\text{Number of adults 25 years and over}}$  |   |
| Child poverty rate                   | $100 \times \frac{\text{Children under the federal poverty level}}{\text{Total children}}$   |   |

<sup>a</sup> Values for the first two predictors vary across the year-specific equations of our regression model, while values for the third through seventh predictors do not vary.

<sup>b</sup> For the 2006, 2007, and 2008 estimates of the resident population, we used the July 1 population estimates released by the Census Bureau in May 2010, available at <http://www.census.gov/popest/datasets.html>.

Table A.9. Values for Temporally Constant Predictors

|                      | Values for Temporally Constant Predictors |                             |                               |                        |                    |
|----------------------|---|-----------------------------|-------------------------------|------------------------|--------------------|
|                      | Single mother household rate              | Owner-occupied housing rate | High rental housing cost rate | Bachelor's degree rate | Child poverty rate |
| Alabama              | 10.0                                      | 71.3                        | 41.0                          | 21.5                   | 22.9               |
| Alaska               | 8.6                                       | 64.1                        | 37.6                          | 26.5                   | 13.0               |
| Arizona              | 8.3                                       | 68.3                        | 46.1                          | 25.3                   | 20.2               |
| Arkansas             | 9.4                                       | 67.8                        | 42.1                          | 18.8                   | 25.2               |
| California           | 8.5                                       | 57.8                        | 51.7                          | 29.4                   | 17.9               |
| Colorado             | 7.0                                       | 68.3                        | 47.0                          | 35.0                   | 16.0               |
| Connecticut          | 8.0                                       | 69.6                        | 47.7                          | 34.8                   | 11.5               |
| Delaware             | 9.1                                       | 73.5                        | 46.4                          | 26.8                   | 14.6               |
| District of Columbia | 11.4                                      | 44.6                        | 45.3                          | 47.2                   | 27.0               |
| Florida              | 8.2                                       | 70.3                        | 52.8                          | 25.7                   | 17.6               |
| Georgia              | 10.6                                      | 67.8                        | 45.1                          | 27.0                   | 19.8               |
| Hawaii               | 7.5                                       | 58.9                        | 47.9                          | 29.2                   | 10.6               |
| Idaho                | 6.7                                       | 71.3                        | 39.5                          | 24.0                   | 15.7               |
| Illinois             | 8.5                                       | 69.8                        | 46.1                          | 29.5                   | 16.8               |
| Indiana              | 8.4                                       | 72.0                        | 43.4                          | 22.3                   | 17.7               |
| Iowa                 | 6.6                                       | 73.4                        | 39.4                          | 24.2                   | 14.1               |
| Kansas               | 7.4                                       | 69.9                        | 39.9                          | 29.0                   | 14.9               |
| Kentucky             | 8.4                                       | 70.4                        | 40.0                          | 20.0                   | 23.5               |
| Louisiana            | 11.3                                      | 68.3                        | 42.9                          | 20.4                   | 26.6               |
| Maine                | 6.9                                       | 72.8                        | 43.9                          | 25.9                   | 16.6               |
| Maryland             | 9.3                                       | 69.4                        | 45.8                          | 35.1                   | 10.1               |
| Massachusetts        | 7.8                                       | 64.9                        | 47.5                          | 37.7                   | 12.6               |
| Michigan             | 8.5                                       | 74.7                        | 48.2                          | 24.7                   | 19.0               |
| Minnesota            | 6.6                                       | 75.3                        | 45.1                          | 31.1                   | 12.1               |
| Mississippi          | 12.8                                      | 70.8                        | 42.7                          | 19.0                   | 29.7               |
| Missouri             | 8.4                                       | 70.5                        | 42.1                          | 24.5                   | 18.3               |
| Montana              | 6.1                                       | 69.5                        | 39.0                          | 27.1                   | 19.1               |
| Nebraska             | 6.7                                       | 68.7                        | 38.1                          | 27.3                   | 14.2               |
| Nevada               | 8.1                                       | 60.5                        | 47.6                          | 21.4                   | 14.9               |
| New Hampshire        | 6.5                                       | 72.9                        | 44.7                          | 32.6                   | 9.3                |
| New Jersey           | 7.9                                       | 67.3                        | 47.9                          | 34.0                   | 12.0               |
| New Mexico           | 9.7                                       | 69.4                        | 42.2                          | 24.9                   | 24.9               |
| New York             | 9.2                                       | 55.6                        | 47.8                          | 31.6                   | 19.5               |
| North Carolina       | 9.2                                       | 68.1                        | 42.4                          | 25.6                   | 20.0               |
| North Dakota         | 5.8                                       | 66.3                        | 35.9                          | 26.1                   | 14.1               |
| Ohio                 | 8.7                                       | 69.6                        | 44.6                          | 23.8                   | 18.5               |
| Oklahoma             | 8.5                                       | 68.1                        | 39.9                          | 22.4                   | 23.2               |
| Oregon               | 7.0                                       | 64.4                        | 46.6                          | 28.0                   | 17.5               |
| Pennsylvania         | 7.6                                       | 71.4                        | 43.4                          | 25.9                   | 16.6               |
| Rhode Island         | 8.8                                       | 62.8                        | 45.9                          | 29.8                   | 16.1               |
| South Carolina       | 10.4                                      | 70.3                        | 40.2                          | 23.2                   | 21.8               |
| South Dakota         | 7.1                                       | 69.0                        | 34.8                          | 24.8                   | 17.3               |
| Tennessee            | 9.0                                       | 70.0                        | 41.8                          | 22.2                   | 22.4               |
| Texas                | 9.9                                       | 65.1                        | 44.0                          | 25.1                   | 23.1               |
| Utah                 | 6.3                                       | 72.1                        | 40.4                          | 28.8                   | 11.1               |
| Vermont              | 7.2                                       | 72.4                        | 46.6                          | 33.1                   | 13.2               |
| Virginia             | 8.2                                       | 69.3                        | 42.6                          | 33.2                   | 13.0               |
| Washington           | 7.3                                       | 65.6                        | 45.1                          | 30.5                   | 15.1               |
| West Virginia        | 6.8                                       | 74.4                        | 37.9                          | 17.0                   | 23.8               |
| Wisconsin            | 7.1                                       | 70.3                        | 42.5                          | 25.5                   | 14.2               |
| Wyoming              | 6.3                                       | 69.8                        | 30.1                          | 23.3                   | 11.2               |

Table A.10. Values for Temporally Variable Predictors

|                      | Values for Temporally Variable Predictors |        |        |                               |        |        |
|----------------------|---|--------|--------|-------------------------------|--------|--------|
|                      | Income-eligible SNAP prevalence rate      |        |        | Elderly combined poverty rate |        |        |
|                      | 2006                                      | 2007   | 2008   | 2006                          | 2007   | 2008   |
| Alabama              | 11.586                                    | 11.552 | 12.068 | 53.857                        | 50.964 | 52.387 |
| Alaska               | 8.079                                     | 8.022  | 7.926  | 35.688                        | 31.903 | 30.692 |
| Arizona              | 8.429                                     | 8.353  | 9.092  | 47.662                        | 45.100 | 47.305 |
| Arkansas             | 13.151                                    | 13.011 | 12.892 | 53.091                        | 50.677 | 52.382 |
| California           | 5.455                                     | 5.575  | 6.003  | 47.296                        | 44.498 | 46.270 |
| Colorado             | 5.144                                     | 5.069  | 5.062  | 38.369                        | 36.008 | 37.860 |
| Connecticut          | 5.827                                     | 5.829  | 6.159  | 40.024                        | 36.601 | 37.948 |
| Delaware             | 6.969                                     | 6.995  | 7.650  | 37.377                        | 34.777 | 36.782 |
| District of Columbia | 14.582                                    | 14.191 | 14.585 | 49.847                        | 47.335 | 47.752 |
| Florida              | 6.553                                     | 6.611  | 7.867  | 48.503                        | 45.439 | 47.744 |
| Georgia              | 9.744                                     | 9.543  | 10.396 | 50.446                        | 48.047 | 49.531 |
| Hawaii               | 6.815                                     | 6.917  | 7.394  | 41.820                        | 39.093 | 40.330 |
| Idaho                | 6.085                                     | 5.678  | 6.443  | 43.362                        | 40.194 | 43.064 |
| Illinois             | 9.379                                     | 9.606  | 9.988  | 43.108                        | 39.871 | 41.517 |
| Indiana              | 8.900                                     | 8.942  | 9.477  | 43.249                        | 40.803 | 42.803 |
| Iowa                 | 7.386                                     | 7.748  | 8.179  | 39.797                        | 36.249 | 38.205 |
| Kansas               | 6.433                                     | 6.498  | 6.509  | 39.734                        | 37.038 | 38.323 |
| Kentucky             | 13.677                                    | 13.887 | 14.425 | 54.098                        | 51.268 | 53.036 |
| Louisiana            | 14.728                                    | 14.364 | 14.450 | 55.612                        | 52.969 | 53.551 |
| Maine                | 11.363                                    | 11.111 | 11.985 | 47.861                        | 44.933 | 46.928 |
| Maryland             | 5.132                                     | 5.240  | 5.964  | 40.342                        | 37.182 | 38.638 |
| Massachusetts        | 6.413                                     | 6.605  | 7.283  | 43.453                        | 40.627 | 42.009 |
| Michigan             | 10.216                                    | 11.214 | 11.541 | 41.298                        | 38.600 | 40.668 |
| Minnesota            | 4.949                                     | 5.160  | 5.432  | 37.621                        | 34.619 | 36.897 |
| Mississippi          | 13.949                                    | 14.414 | 15.101 | 59.735                        | 56.283 | 57.061 |
| Missouri             | 11.373                                    | 11.207 | 11.55  | 45.471                        | 42.721 | 44.869 |
| Montana              | 8.240                                     | 8.096  | 8.144  | 41.572                        | 38.605 | 40.492 |
| Nebraska             | 6.674                                     | 6.741  | 6.732  | 41.174                        | 37.698 | 39.543 |
| Nevada               | 4.662                                     | 4.679  | 5.417  | 40.569                        | 37.949 | 40.174 |
| New Hampshire        | 4.200                                     | 4.313  | 4.677  | 39.811                        | 37.236 | 39.091 |
| New Jersey           | 4.581                                     | 4.723  | 4.939  | 42.231                        | 39.269 | 40.567 |
| New Mexico           | 12.265                                    | 11.598 | 11.829 | 48.181                        | 45.480 | 46.894 |
| New York             | 9.090                                     | 9.085  | 9.771  | 50.996                        | 48.192 | 49.410 |
| North Carolina       | 9.493                                     | 9.668  | 10.163 | 48.565                        | 46.423 | 47.923 |
| North Dakota         | 6.278                                     | 6.664  | 7.033  | 40.175                        | 36.647 | 37.417 |
| Ohio                 | 8.964                                     | 9.013  | 9.874  | 44.138                        | 41.421 | 43.554 |
| Oklahoma             | 11.786                                    | 11.272 | 11.168 | 48.188                        | 45.564 | 46.701 |
| Oregon               | 10.468                                    | 10.792 | 11.113 | 41.852                        | 39.297 | 41.686 |
| Pennsylvania         | 8.623                                     | 8.896  | 9.337  | 46.757                        | 44.165 | 45.814 |
| Rhode Island         | 6.756                                     | 7.113  | 7.915  | 48.798                        | 45.298 | 46.983 |
| South Carolina       | 12.032                                    | 12.068 | 12.815 | 49.713                        | 47.228 | 48.660 |
| South Dakota         | 7.338                                     | 7.458  | 7.786  | 39.306                        | 35.832 | 37.313 |
| Tennessee            | 13.845                                    | 13.688 | 14.248 | 52.241                        | 49.346 | 50.995 |
| Texas                | 10.350                                    | 9.610  | 9.909  | 49.999                        | 47.906 | 48.481 |
| Utah                 | 4.989                                     | 4.549  | 4.782  | 39.291                        | 36.502 | 38.637 |
| Vermont              | 7.221                                     | 7.578  | 8.448  | 43.963                        | 41.086 | 42.501 |
| Virginia             | 6.435                                     | 6.501  | 6.838  | 42.229                        | 39.109 | 40.563 |
| Washington           | 8.235                                     | 8.104  | 8.59   | 38.032                        | 35.067 | 36.976 |
| West Virginia        | 14.193                                    | 14.402 | 14.834 | 56.050                        | 53.001 | 54.386 |
| Wisconsin            | 5.956                                     | 6.319  | 6.758  | 41.005                        | 37.527 | 39.798 |
| Wyoming              | 4.645                                     | 4.145  | 4.188  | 37.387                        | 33.658 | 35.361 |

Table A.11. Regression Estimates of SNAP Participation Rates

|                      | Regression Estimates of SNAP Participation Rates (Percent) |        |        |              |        |        |
|----------------------|--|--------|--------|--------------|--------|--------|
|                      | All Eligible People  |        |        | Working Poor |        |        |
|                      | 2006   | 2007   | 2008   | 2006         | 2007   | 2008   |
| Alabama              | 65.520   | 64.556 | 65.109 | 58.700       | 60.508 | 59.009 |
| Alaska               | 74.620   | 73.815 | 70.375 | 65.763       | 58.764 | 65.316 |
| Arizona              | 60.608   | 59.137 | 61.394 | 52.756       | 52.700 | 51.637 |
| Arkansas             | 73.918   | 73.959 | 69.616 | 68.994       | 69.134 | 63.786 |
| California           | 48.843   | 47.040 | 48.505 | 33.012       | 32.081 | 29.205 |
| Colorado             | 56.581   | 53.968 | 51.805 | 44.012       | 42.861 | 39.164 |
| Connecticut          | 68.844   | 65.363 | 65.076 | 51.772       | 50.934 | 49.395 |
| Delaware             | 71.342   | 67.902 | 64.412 | 67.100       | 56.762 | 59.883 |
| District of Columbia | 82.971   | 78.453 | 83.867 | 40.444       | 39.768 | 41.566 |
| Florida              | 58.701   | 56.707 | 61.415 | 50.123       | 50.067 | 49.346 |
| Georgia              | 65.170   | 59.870 | 62.151 | 52.166       | 48.238 | 49.164 |
| Hawaii               | 75.344   | 73.607 | 76.856 | 56.517       | 56.474 | 56.235 |
| Idaho                | 52.080   | 49.603 | 53.735 | 48.556       | 49.953 | 50.545 |
| Illinois             | 78.458   | 78.827 | 77.497 | 65.978       | 66.054 | 64.990 |
| Indiana              | 70.666   | 69.882 | 68.538 | 67.791       | 64.337 | 64.842 |
| Iowa                 | 68.050   | 71.812 | 72.335 | 64.782       | 69.047 | 69.930 |
| Kansas               | 59.297   | 58.688 | 57.245 | 51.123       | 51.797 | 50.954 |
| Kentucky             | 79.108   | 82.905 | 85.717 | 71.848       | 80.545 | 77.786 |
| Louisiana            | 79.221   | 75.967 | 71.811 | 70.910       | 66.805 | 64.102 |
| Maine                | 87.824   | 86.863 | 92.647 | 75.725       | 82.212 | 80.222 |
| Maryland             | 63.432   | 58.423 | 60.260 | 45.434       | 42.285 | 44.309 |
| Massachusetts        | 67.074   | 64.920 | 70.555 | 43.314       | 48.371 | 47.097 |
| Michigan             | 84.250   | 90.715 | 85.136 | 80.675       | 80.734 | 79.186 |
| Minnesota            | 62.812   | 62.457 | 61.119 | 54.980       | 56.635 | 54.051 |
| Mississippi          | 62.447   | 64.648 | 62.818 | 57.493       | 57.188 | 58.003 |
| Missouri             | 83.459   | 82.218 | 81.159 | 74.569       | 74.055 | 72.405 |
| Montana              | 62.088   | 63.675 | 63.763 | 56.314       | 60.811 | 58.668 |
| Nebraska             | 59.676   | 60.902 | 60.701 | 51.227       | 56.001 | 54.207 |
| Nevada               | 51.971   | 50.072 | 50.589 | 48.042       | 39.584 | 42.796 |
| New Hampshire        | 60.481   | 57.973 | 60.263 | 47.317       | 51.594 | 48.382 |
| New Jersey           | 56.972   | 53.989 | 54.321 | 40.019       | 41.283 | 38.047 |
| New Mexico           | 72.971   | 68.350 | 65.308 | 65.976       | 59.807 | 59.036 |
| New York             | 63.233   | 61.247 | 67.085 | 40.056       | 42.736 | 41.911 |
| North Carolina       | 63.241   | 62.637 | 63.904 | 53.515       | 54.741 | 53.923 |
| North Dakota         | 56.290   | 61.409 | 66.197 | 49.060       | 57.834 | 60.476 |
| Ohio                 | 69.400   | 68.654 | 69.766 | 63.902       | 60.492 | 62.786 |
| Oklahoma             | 71.490   | 69.290 | 66.292 | 65.766       | 64.204 | 61.391 |
| Oregon               | 87.098   | 90.363 | 90.332 | 73.984       | 76.776 | 74.369 |
| Pennsylvania         | 68.239   | 69.342 | 71.290 | 58.824       | 64.578 | 61.730 |
| Rhode Island         | 54.737   | 55.005 | 60.264 | 37.554       | 42.431 | 42.328 |
| South Carolina       | 73.564   | 72.310 | 73.32  | 65.690       | 63.775 | 66.072 |
| South Dakota         | 56.330   | 59.184 | 59.962 | 53.686       | 55.450 | 59.248 |
| Tennessee            | 85.528   | 85.472 | 87.112 | 75.734       | 78.965 | 77.162 |
| Texas                | 62.467   | 55.318 | 54.737 | 52.600       | 45.761 | 45.095 |
| Utah                 | 58.708   | 54.166 | 55.397 | 50.338       | 51.081 | 49.062 |
| Vermont              | 71.450   | 71.724 | 77.501 | 55.190       | 62.532 | 61.477 |
| Virginia             | 62.776   | 60.314 | 61.617 | 46.889       | 48.897 | 47.988 |
| Washington           | 78.091   | 76.792 | 77.317 | 65.511       | 62.607 | 64.002 |
| West Virginia        | 79.935   | 86.226 | 90.626 | 76.317       | 91.838 | 86.858 |
| Wisconsin            | 58.954   | 61.336 | 61.616 | 53.523       | 56.169 | 56.009 |
| Wyoming              | 47.278   | 44.923 | 45.714 | 45.723       | 45.975 | 48.769 |

Table A.12. Standard Errors of Regression Estimates of SNAP Participation Rates

|                      | Standard Errors of Regression Estimates of SNAP Participation Rates |       |       |              |       |       |
|----------------------|---|-------|-------|--------------|-------|-------|
|                      | All Eligible People   |       |       | Working Poor |       |       |
|                      | 2006  | 2007  | 2008  | 2006         | 2007  | 2008  |
| Alabama              | 2.809   | 2.718 | 2.665 | 4.942        | 4.951 | 4.839 |
| Alaska               | 3.973   | 3.780 | 3.994 | 6.549        | 6.543 | 6.970 |
| Arizona              | 2.469   | 2.464 | 2.403 | 4.513        | 4.552 | 4.468 |
| Arkansas             | 2.711   | 2.731 | 2.634 | 4.870        | 4.991 | 4.785 |
| California           | 2.835   | 2.760 | 2.775 | 5.202        | 5.079 | 5.070 |
| Colorado             | 3.612   | 3.332 | 3.290 | 5.733        | 5.709 | 5.630 |
| Connecticut          | 2.775   | 2.752 | 2.709 | 4.921        | 4.951 | 4.857 |
| Delaware             | 3.277   | 3.225 | 3.123 | 5.904        | 5.767 | 5.605 |
| District of Columbia | 5.717   | 4.923 | 5.415 | 8.512        | 8.628 | 8.470 |
| Florida              | 3.005   | 2.923 | 2.926 | 5.324        | 5.320 | 5.209 |
| Georgia              | 2.774   | 2.726 | 2.673 | 4.929        | 4.940 | 4.844 |
| Hawaii               | 4.034   | 3.817 | 3.609 | 6.367        | 6.455 | 6.113 |
| Idaho                | 2.821   | 2.784 | 2.775 | 4.914        | 4.946 | 4.938 |
| Illinois             | 2.601   | 2.622 | 2.569 | 4.741        | 4.790 | 4.717 |
| Indiana              | 2.567   | 2.497 | 2.464 | 4.662        | 4.587 | 4.537 |
| Iowa                 | 2.623   | 2.632 | 2.626 | 4.674        | 4.768 | 4.778 |
| Kansas               | 2.650   | 2.526 | 2.562 | 4.644        | 4.545 | 4.595 |
| Kentucky             | 2.963   | 3.044 | 3.000 | 5.359        | 5.604 | 5.449 |
| Louisiana            | 3.006   | 2.870 | 2.734 | 5.219        | 5.171 | 4.934 |
| Maine                | 3.404   | 3.224 | 3.204 | 5.986        | 5.862 | 5.803 |
| Maryland             | 3.379   | 3.342 | 3.263 | 5.832        | 5.870 | 5.694 |
| Massachusetts        | 2.922   | 2.876 | 2.875 | 5.053        | 5.172 | 5.064 |
| Michigan             | 3.420   | 3.588 | 3.475 | 6.069        | 6.311 | 6.136 |
| Minnesota            | 2.909   | 2.850 | 2.832 | 5.014        | 5.060 | 5.024 |
| Mississippi          | 3.808   | 3.564 | 3.317 | 6.313        | 6.190 | 5.814 |
| Missouri             | 2.733   | 2.601 | 2.512 | 4.905        | 4.793 | 4.651 |
| Montana              | 3.434   | 3.336 | 3.251 | 5.646        | 5.669 | 5.580 |
| Nebraska             | 2.699   | 2.605 | 2.652 | 4.761        | 4.682 | 4.741 |
| Nevada               | 3.661   | 3.463 | 3.433 | 6.085        | 5.817 | 5.883 |
| New Hampshire        | 2.887   | 2.909 | 2.906 | 5.008        | 5.183 | 5.121 |
| New Jersey           | 2.639   | 2.631 | 2.629 | 4.729        | 4.797 | 4.735 |
| New Mexico           | 2.906   | 2.926 | 2.811 | 5.013        | 5.146 | 4.955 |
| New York             | 2.839   | 2.768 | 2.838 | 5.105        | 5.165 | 5.082 |
| North Carolina       | 2.375   | 2.349 | 2.338 | 4.369        | 4.388 | 4.356 |
| North Dakota         | 3.195   | 3.076 | 3.101 | 5.487        | 5.365 | 5.386 |
| Ohio                 | 2.460   | 2.443 | 2.408 | 4.530        | 4.497 | 4.468 |
| Oklahoma             | 2.622   | 2.654 | 2.623 | 4.715        | 4.784 | 4.708 |
| Oregon               | 3.466   | 3.463 | 3.310 | 5.944        | 6.094 | 5.852 |
| Pennsylvania         | 2.452   | 2.493 | 2.462 | 4.519        | 4.658 | 4.575 |
| Rhode Island         | 2.680   | 2.558 | 2.589 | 4.858        | 4.752 | 4.715 |
| South Carolina       | 2.797   | 2.681 | 2.634 | 4.952        | 4.893 | 4.813 |
| South Dakota         | 3.299   | 3.110 | 3.063 | 5.512        | 5.337 | 5.273 |
| Tennessee            | 2.922   | 2.816 | 2.773 | 5.214        | 5.191 | 5.064 |
| Texas                | 2.514   | 2.573 | 2.519 | 4.555        | 4.690 | 4.606 |
| Utah                 | 2.711   | 2.697 | 2.770 | 4.745        | 4.830 | 4.909 |
| Vermont              | 2.931   | 2.913 | 2.880 | 5.132        | 5.209 | 5.161 |
| Virginia             | 2.721   | 2.663 | 2.672 | 4.800        | 4.804 | 4.777 |
| Washington           | 2.961   | 2.889 | 2.858 | 5.176        | 5.163 | 5.128 |
| West Virginia        | 3.855   | 3.988 | 3.806 | 6.892        | 7.228 | 6.829 |
| Wisconsin            | 2.460   | 2.404 | 2.398 | 4.436        | 4.410 | 4.409 |
| Wyoming              | 4.148   | 3.780 | 3.891 | 6.732        | 6.380 | 6.522 |

Table A.13. Preliminary Shrinkage Estimates of SNAP Participation Rates

|                      | Preliminary Shrinkage Estimates of SNAP Participation Rates (Percent) |        |        |              |        |        |
|----------------------|---|--------|--------|--------------|--------|--------|
|                      | All Eligible People   |        |        | Working Poor |        |        |
|                      | 2006  | 2007   | 2008   | 2006         | 2007   | 2008   |
| Alabama              | 66.267  | 65.404 | 65.853 | 58.557       | 60.637 | 58.886 |
| Alaska               | 73.427  | 72.782 | 69.173 | 67.128       | 60.334 | 66.763 |
| Arizona              | 59.985  | 58.752 | 60.446 | 54.278       | 53.960 | 52.924 |
| Arkansas             | 73.723  | 73.946 | 69.559 | 67.502       | 68.027 | 62.755 |
| California           | 49.625  | 47.941 | 49.427 | 34.262       | 33.186 | 30.402 |
| Colorado             | 56.217  | 53.654 | 51.335 | 44.373       | 43.590 | 39.673 |
| Connecticut          | 68.817  | 65.114 | 64.870 | 51.015       | 49.886 | 48.414 |
| Delaware             | 71.442  | 67.776 | 64.495 | 67.389       | 56.808 | 60.041 |
| District of Columbia | 83.378  | 78.793 | 84.250 | 38.417       | 37.726 | 39.514 |
| Florida              | 58.596  | 56.425 | 61.167 | 47.469       | 47.329 | 46.496 |
| Georgia              | 66.136  | 60.803 | 63.206 | 54.789       | 50.868 | 51.781 |
| Hawaii               | 75.456  | 73.871 | 76.976 | 56.511       | 56.688 | 56.343 |
| Idaho                | 52.266  | 49.686 | 53.695 | 49.095       | 50.516 | 51.039 |
| Illinois             | 79.353  | 79.845 | 78.340 | 65.807       | 65.823 | 64.691 |
| Indiana              | 70.655  | 69.912 | 68.390 | 69.360       | 65.858 | 66.101 |
| Iowa                 | 69.485  | 73.335 | 74.156 | 64.387       | 68.908 | 69.612 |
| Kansas               | 58.009  | 57.449 | 55.931 | 47.644       | 47.971 | 47.011 |
| Kentucky             | 78.397  | 82.064 | 84.957 | 69.016       | 77.712 | 74.717 |
| Louisiana            | 78.728  | 75.487 | 71.178 | 71.655       | 67.744 | 64.637 |
| Maine                | 88.279  | 87.265 | 92.997 | 78.252       | 84.623 | 82.604 |
| Maryland             | 63.280  | 58.516 | 60.263 | 46.259       | 43.225 | 45.035 |
| Massachusetts        | 65.207  | 63.274 | 68.906 | 40.368       | 45.784 | 44.537 |
| Michigan             | 83.214  | 89.864 | 84.237 | 82.091       | 82.335 | 80.778 |
| Minnesota            | 63.047  | 62.686 | 61.233 | 50.137       | 52.114 | 49.368 |
| Mississippi          | 62.555  | 64.720 | 63.148 | 57.536       | 57.228 | 58.170 |
| Missouri             | 83.990  | 82.597 | 81.715 | 75.024       | 74.284 | 72.876 |
| Montana              | 62.183  | 63.723 | 63.919 | 58.624       | 62.960 | 60.861 |
| Nebraska             | 60.881  | 62.005 | 61.675 | 52.246       | 57.191 | 55.221 |
| Nevada               | 51.967  | 49.957 | 50.619 | 44.932       | 36.494 | 39.752 |
| New Hampshire        | 60.939  | 58.607 | 60.786 | 47.469       | 51.653 | 48.583 |
| New Jersey           | 55.955  | 52.924 | 53.332 | 42.016       | 43.444 | 40.153 |
| New Mexico           | 72.983  | 68.530 | 65.384 | 68.779       | 62.603 | 61.847 |
| New York             | 62.735  | 60.476 | 66.556 | 45.162       | 47.512 | 46.854 |
| North Carolina       | 63.312  | 62.505 | 64.068 | 54.924       | 56.292 | 55.828 |
| North Dakota         | 56.138  | 61.366 | 66.095 | 49.316       | 57.894 | 60.644 |
| Ohio                 | 68.711  | 67.928 | 68.985 | 63.585       | 59.941 | 62.591 |
| Oklahoma             | 71.300  | 69.318 | 66.469 | 63.327       | 61.986 | 59.171 |
| Oregon               | 87.392  | 90.621 | 90.692 | 75.094       | 77.983 | 75.535 |
| Pennsylvania         | 70.022  | 71.213 | 73.209 | 60.017       | 65.683 | 62.791 |
| Rhode Island         | 55.051  | 55.559 | 60.437 | 34.183       | 39.386 | 38.766 |
| South Carolina       | 74.109  | 72.710 | 73.624 | 64.197       | 61.961 | 64.687 |
| South Dakota         | 56.923  | 59.766 | 60.451 | 54.632       | 56.522 | 59.935 |
| Tennessee            | 84.653  | 84.429 | 85.974 | 70.171       | 73.132 | 71.300 |
| Texas                | 62.252  | 55.088 | 54.571 | 52.837       | 45.847 | 45.380 |
| Utah                 | 57.282  | 52.628 | 54.399 | 47.927       | 48.629 | 46.902 |
| Vermont              | 71.772  | 71.858 | 77.790 | 57.026       | 64.177 | 63.361 |
| Virginia             | 63.051  | 60.609 | 61.828 | 48.919       | 50.909 | 50.031 |
| Washington           | 79.094  | 77.628 | 78.298 | 64.600       | 61.479 | 63.202 |
| West Virginia        | 79.091  | 85.487 | 89.833 | 77.670       | 93.279 | 88.377 |
| Wisconsin            | 59.290  | 61.556 | 61.952 | 55.690       | 58.386 | 58.241 |
| Wyoming              | 46.989  | 44.524 | 45.298 | 45.632       | 45.726 | 48.739 |

Table A.14. Final Shrinkage Estimates of SNAP Participation Rates

|                      | Final Shrinkage Estimates of SNAP Participation Rates (Percent) |        |        |              |        |        |
|----------------------|---|--------|--------|--------------|--------|--------|
|                      | All Eligible People   |        |        | Working Poor |        |        |
|                      | 2006  | 2007   | 2008   | 2006         | 2007   | 2008   |
| Alabama              | 67.125  | 66.452 | 66.895 | 60.258       | 61.907 | 60.496 |
| Alaska               | 74.379  | 73.949 | 70.266 | 69.077       | 61.598 | 68.588 |
| Arizona              | 60.762  | 59.693 | 61.401 | 55.855       | 55.091 | 54.371 |
| Arkansas             | 74.679  | 75.131 | 70.659 | 69.462       | 69.453 | 64.471 |
| California           | 50.268  | 48.709 | 50.208 | 35.258       | 33.881 | 31.233 |
| Colorado             | 56.946  | 54.514 | 52.147 | 45.661       | 44.504 | 40.758 |
| Connecticut          | 69.709  | 66.157 | 65.895 | 52.497       | 50.931 | 49.737 |
| Delaware             | 72.368  | 68.862 | 65.515 | 69.346       | 57.998 | 61.683 |
| District of Columbia | 84.458  | 80.055 | 85.583 | 39.532       | 38.517 | 40.594 |
| Florida              | 59.356  | 57.329 | 62.134 | 48.847       | 48.321 | 47.767 |
| Georgia              | 66.993  | 61.777 | 64.205 | 56.380       | 51.934 | 53.196 |
| Hawaii               | 76.433  | 75.054 | 78.193 | 58.152       | 57.876 | 57.883 |
| Idaho                | 52.943  | 50.483 | 54.544 | 50.521       | 51.575 | 52.435 |
| Illinois             | 80.382  | 81.125 | 79.578 | 67.718       | 67.203 | 66.459 |
| Indiana              | 71.571  | 71.032 | 69.472 | 71.374       | 67.238 | 67.908 |
| Iowa                 | 70.385  | 74.510 | 75.329 | 66.257       | 70.352 | 71.515 |
| Kansas               | 58.760  | 58.370 | 56.815 | 49.028       | 48.976 | 48.296 |
| Kentucky             | 79.413  | 83.379 | 86.300 | 71.021       | 79.340 | 76.759 |
| Louisiana            | 79.748  | 76.697 | 72.303 | 73.736       | 69.163 | 66.404 |
| Maine                | 89.423  | 88.664 | 94.468 | 80.525       | 86.396 | 84.863 |
| Maryland             | 64.100  | 59.453 | 61.215 | 47.603       | 44.130 | 46.266 |
| Massachusetts        | 66.053  | 64.288 | 69.996 | 41.540       | 46.743 | 45.755 |
| Michigan             | 84.293  | 91.304 | 85.569 | 84.476       | 84.060 | 82.986 |
| Minnesota            | 63.864  | 63.690 | 62.201 | 51.593       | 53.206 | 50.718 |
| Mississippi          | 63.366  | 65.757 | 64.146 | 59.207       | 58.427 | 59.761 |
| Missouri             | 85.079  | 83.921 | 83.007 | 77.202       | 75.841 | 74.869 |
| Montana              | 62.989  | 64.745 | 64.930 | 60.326       | 64.279 | 62.525 |
| Nebraska             | 61.670  | 62.999 | 62.650 | 53.764       | 58.390 | 56.731 |
| Nevada               | 52.640  | 50.758 | 51.419 | 46.237       | 37.259 | 40.839 |
| New Hampshire        | 61.729  | 59.546 | 61.748 | 48.847       | 52.735 | 49.911 |
| New Jersey           | 56.680  | 53.772 | 54.175 | 43.236       | 44.355 | 41.251 |
| New Mexico           | 73.929  | 69.628 | 66.418 | 70.777       | 63.914 | 63.538 |
| New York             | 63.548  | 61.445 | 67.608 | 46.473       | 48.508 | 48.135 |
| North Carolina       | 64.132  | 63.506 | 65.081 | 56.519       | 57.472 | 57.354 |
| North Dakota         | 56.865  | 62.349 | 67.140 | 50.748       | 59.107 | 62.302 |
| Ohio                 | 69.601  | 69.016 | 70.076 | 65.432       | 61.197 | 64.302 |
| Oklahoma             | 72.224  | 70.429 | 67.520 | 65.166       | 63.285 | 60.789 |
| Oregon               | 88.525  | 92.074 | 92.125 | 77.275       | 79.617 | 77.600 |
| Pennsylvania         | 70.929  | 72.354 | 74.367 | 61.760       | 67.059 | 64.507 |
| Rhode Island         | 55.764  | 56.449 | 61.393 | 35.176       | 40.212 | 39.826 |
| South Carolina       | 75.069  | 73.875 | 74.788 | 66.062       | 63.260 | 66.455 |
| South Dakota         | 57.660  | 60.724 | 61.407 | 56.219       | 57.706 | 61.574 |
| Tennessee            | 85.750  | 85.782 | 87.334 | 72.209       | 74.665 | 73.249 |
| Texas                | 63.059  | 55.970 | 55.434 | 54.371       | 46.807 | 46.620 |
| Utah                 | 58.024  | 53.471 | 55.259 | 49.319       | 49.648 | 48.185 |
| Vermont              | 72.702  | 73.009 | 79.020 | 58.682       | 65.522 | 65.093 |
| Virginia             | 63.869  | 61.580 | 62.805 | 50.339       | 51.976 | 51.398 |
| Washington           | 80.119  | 78.872 | 79.536 | 66.476       | 62.768 | 64.930 |
| West Virginia        | 80.116  | 86.857 | 91.253 | 79.926       | 95.234 | 90.793 |
| Wisconsin            | 60.058  | 62.543 | 62.932 | 57.307       | 59.609 | 59.833 |
| Wyoming              | 47.598  | 45.238 | 46.014 | 46.957       | 46.684 | 50.072 |



Table A.15. Standard Errors of Final Shrinkage Estimates of SNAP Participation Rates

|                      | Standard Errors of Final Shrinkage Estimates of SNAP Participation Rates |       |       |              |       |       |
|----------------------|--|-------|-------|--------------|-------|-------|
|                      | All Eligible People  |       |       | Working Poor |       |       |
|                      | 2006   | 2007  | 2008  | 2006         | 2007  | 2008  |
| Alabama              | 2.555  | 2.470 | 2.396 | 3.863        | 4.001 | 3.779 |
| Alaska               | 3.753  | 3.463 | 3.608 | 5.794        | 5.803 | 6.156 |
| Arizona              | 2.071  | 2.109 | 1.991 | 3.379        | 3.392 | 3.286 |
| Arkansas             | 2.333  | 2.466 | 2.343 | 3.718        | 4.182 | 3.858 |
| California           | 1.584  | 1.419 | 1.418 | 2.654        | 2.366 | 2.227 |
| Colorado             | 3.173  | 2.754 | 2.624 | 4.309        | 4.166 | 3.899 |
| Connecticut          | 2.415  | 2.367 | 2.248 | 3.954        | 3.829 | 3.656 |
| Delaware             | 2.940  | 2.853 | 2.789 | 5.201        | 4.873 | 4.723 |
| District of Columbia | 5.379  | 4.379 | 5.010 | 7.239        | 7.336 | 7.120 |
| Florida              | 2.187  | 2.187 | 2.227 | 3.587        | 3.662 | 3.499 |
| Georgia              | 2.341  | 2.264 | 2.238 | 3.809        | 3.624 | 3.626 |
| Hawaii               | 3.747  | 3.551 | 3.326 | 5.186        | 5.486 | 5.077 |
| Idaho                | 2.568  | 2.535 | 2.486 | 4.121        | 4.115 | 3.997 |
| Illinois             | 2.265  | 2.309 | 2.239 | 3.793        | 3.747 | 3.654 |
| Indiana              | 2.286  | 2.170 | 2.113 | 3.855        | 3.711 | 3.568 |
| Iowa                 | 2.688  | 2.764 | 2.709 | 4.010        | 4.261 | 4.177 |
| Kansas               | 2.471  | 2.273 | 2.387 | 3.410        | 3.059 | 3.260 |
| Kentucky             | 2.779  | 2.768 | 2.797 | 4.710        | 4.904 | 4.617 |
| Louisiana            | 2.698  | 2.458 | 2.359 | 4.517        | 4.336 | 3.923 |
| Maine                | 3.260  | 3.028 | 2.991 | 5.776        | 5.493 | 5.442 |
| Maryland             | 2.870  | 2.816 | 2.660 | 4.664        | 4.560 | 4.222 |
| Massachusetts        | 2.781  | 2.725 | 2.842 | 3.830        | 4.270 | 4.157 |
| Michigan             | 3.019  | 3.292 | 3.107 | 5.226        | 5.589 | 5.304 |
| Minnesota            | 2.653  | 2.648 | 2.651 | 3.967        | 4.186 | 4.315 |
| Mississippi          | 3.306  | 3.125 | 2.607 | 5.012        | 5.028 | 4.274 |
| Missouri             | 2.496  | 2.358 | 2.254 | 4.265        | 4.036 | 4.033 |
| Montana              | 3.221  | 3.114 | 2.985 | 5.002        | 5.026 | 5.050 |
| Nebraska             | 2.546  | 2.583 | 2.535 | 3.708        | 3.818 | 3.723 |
| Nevada               | 3.083  | 2.895 | 2.861 | 4.490        | 3.815 | 4.183 |
| New Hampshire        | 2.593  | 2.678 | 2.596 | 4.182        | 4.354 | 4.274 |
| New Jersey           | 2.215  | 2.235 | 2.296 | 3.634        | 3.740 | 3.655 |
| New Mexico           | 2.592  | 2.698 | 2.540 | 4.191        | 4.421 | 4.176 |
| New York             | 1.949  | 1.911 | 2.034 | 3.752        | 3.708 | 3.763 |
| North Carolina       | 1.878  | 1.838 | 1.833 | 3.124        | 3.095 | 3.163 |
| North Dakota         | 2.800  | 2.768 | 2.881 | 4.750        | 4.560 | 4.762 |
| Ohio                 | 2.055  | 2.023 | 1.908 | 3.421        | 3.210 | 3.301 |
| Oklahoma             | 2.232  | 2.308 | 2.267 | 3.665        | 3.728 | 3.565 |
| Oregon               | 3.150  | 3.219 | 3.091 | 5.334        | 5.583 | 5.332 |
| Pennsylvania         | 2.473  | 2.539 | 2.435 | 3.947        | 4.130 | 4.017 |
| Rhode Island         | 2.353  | 2.213 | 2.235 | 3.737        | 3.771 | 3.445 |
| South Carolina       | 2.428  | 2.190 | 2.224 | 4.116        | 3.832 | 4.023 |
| South Dakota         | 3.095  | 3.006 | 2.937 | 4.676        | 4.496 | 4.362 |
| Tennessee            | 2.974  | 2.860 | 2.763 | 4.835        | 4.634 | 4.416 |
| Texas                | 1.640  | 1.667 | 1.581 | 2.615        | 2.533 | 2.432 |
| Utah                 | 2.440  | 2.331 | 2.668 | 3.380        | 3.405 | 3.952 |
| Vermont              | 2.756  | 2.705 | 2.672 | 4.832        | 4.790 | 4.858 |
| Virginia             | 2.561  | 2.543 | 2.487 | 4.163        | 4.165 | 4.084 |
| Washington           | 2.794  | 2.722 | 2.733 | 4.572        | 4.424 | 4.609 |
| West Virginia        | 3.332  | 3.650 | 3.443 | 6.244        | 6.778 | 6.568 |
| Wisconsin            | 2.108  | 2.113 | 2.051 | 3.698        | 3.711 | 3.678 |
| Wyoming              | 3.881  | 3.237 | 3.379 | 5.939        | 5.107 | 5.440 |

Table A.16. Final Shrinkage Estimates of Number of People Eligible for SNAP

|                      | Final Shrinkage Estimates of Number of People Eligible for SNAP |           |           |
|----------------------|---|-----------|-----------|
|                      | 2006  | 2007      | 2008      |
| Alabama              | 792,250   | 806,270   | 843,803   |
| Alaska               | 73,583  | 74,014    | 77,621    |
| Arizona              | 855,336   | 890,280   | 962,407   |
| Arkansas             | 494,680   | 492,213   | 523,225   |
| California           | 3,933,468   | 4,146,081 | 4,373,529 |
| Colorado             | 430,511   | 450,266   | 479,040   |
| Connecticut          | 292,194   | 307,360   | 327,430   |
| Delaware             | 82,124  | 87,854    | 102,314   |
| District of Columbia | 101,084   | 103,952   | 100,564   |
| Florida              | 1,993,557   | 2,107,658 | 2,332,602 |
| Georgia              | 1,358,726   | 1,472,725 | 1,570,225 |
| Hawaii               | 114,000   | 117,672   | 121,748   |
| Idaho                | 168,253   | 168,623   | 180,431   |
| Illinois             | 1,490,791   | 1,513,200 | 1,611,998 |
| Indiana              | 783,787   | 798,876   | 871,445   |
| Iowa                 | 311,923   | 309,741   | 325,071   |
| Kansas               | 301,719   | 308,992   | 320,475   |
| Kentucky             | 724,129   | 708,896   | 716,735   |
| Louisiana            | 783,662   | 819,543   | 889,674   |
| Maine                | 167,085   | 165,082   | 167,426   |
| Maryland             | 448,487   | 496,598   | 551,309   |
| Massachusetts        | 624,675   | 667,758   | 680,881   |
| Michigan             | 1,224,359   | 1,234,414 | 1,349,128 |
| Minnesota            | 399,461   | 420,560   | 456,752   |
| Mississippi          | 638,184   | 640,429   | 692,152   |
| Missouri             | 659,350   | 789,212   | 828,812   |
| Montana              | 123,860   | 119,697   | 121,423   |
| Nebraska             | 190,869   | 189,395   | 191,490   |
| Nevada               | 220,718   | 236,716   | 275,551   |
| New Hampshire        | 89,255  | 95,416    | 100,115   |
| New Jersey           | 700,428   | 758,570   | 789,814   |
| New Mexico           | 322,237   | 327,920   | 353,846   |
| New York             | 2,758,014   | 2,871,840 | 2,813,476 |
| North Carolina       | 1,312,897   | 1,379,847 | 1,444,026 |
| North Dakota         | 70,376  | 68,211    | 67,191    |
| Ohio                 | 1,476,358   | 1,504,571 | 1,624,291 |
| Oklahoma             | 583,825   | 578,129   | 602,731   |
| Oregon               | 436,473   | 437,543   | 456,319   |
| Pennsylvania         | 1,507,827   | 1,539,657 | 1,577,750 |
| Rhode Island         | 128,627   | 132,942   | 135,816   |
| South Carolina       | 694,001   | 722,752   | 771,666   |
| South Dakota         | 100,345   | 97,889    | 102,002   |
| Tennessee            | 980,845   | 984,995   | 1,018,124 |
| Texas                | 3,841,773   | 4,093,040 | 4,344,452 |
| Utah                 | 221,808   | 226,645   | 236,033   |
| Vermont              | 61,655  | 64,398    | 66,399    |
| Virginia             | 769,742   | 814,921   | 848,707   |
| Washington           | 655,235   | 664,257   | 709,174   |
| West Virginia        | 320,428   | 300,325   | 295,023   |
| Wisconsin            | 552,614   | 565,974   | 604,363   |
| Wyoming              | 50,043  | 47,962    | 48,515    |

Table A.17. Final Shrinkage Estimates of Number of Working Poor Eligible for SNAP

|                      | Final Shrinkage Estimates of Number of Working Poor Eligible for SNAP |           |           |
|----------------------|---|-----------|-----------|
|                      | 2006  | 2007      | 2008      |
| Alabama              | 330,934   | 350,693   | 361,876   |
| Alaska               | 36,246  | 39,131    | 37,827    |
| Arizona              | 469,904   | 435,439   | 512,658   |
| Arkansas             | 231,096   | 234,321   | 245,343   |
| California           | 2,225,407   | 2,428,135 | 2,610,429 |
| Colorado             | 192,062   | 229,761   | 249,650   |
| Connecticut          | 110,646   | 120,973   | 129,102   |
| Delaware             | 38,983  | 41,888    | 49,520    |
| District of Columbia | 32,325  | 31,706    | 27,775    |
| Florida              | 904,458   | 932,731   | 994,823   |
| Georgia              | 731,266   | 825,442   | 855,837   |
| Hawaii               | 62,200  | 66,540    | 68,102    |
| Idaho                | 90,602  | 88,221    | 100,524   |
| Illinois             | 681,546   | 679,671   | 750,988   |
| Indiana              | 338,582   | 372,382   | 353,426   |
| Iowa                 | 155,523   | 169,060   | 159,730   |
| Kansas               | 170,037   | 172,938   | 179,323   |
| Kentucky             | 300,230   | 269,710   | 230,175   |
| Louisiana            | 361,199   | 403,821   | 405,250   |
| Maine                | 70,432  | 64,387    | 67,674    |
| Maryland             | 212,802   | 238,867   | 239,655   |
| Massachusetts        | 221,202   | 190,095   | 257,883   |
| Michigan             | 524,447   | 585,655   | 622,629   |
| Minnesota            | 159,647   | 188,310   | 218,606   |
| Mississippi          | 278,365   | 314,036   | 296,845   |
| Missouri             | 323,482   | 352,816   | 405,184   |
| Montana              | 59,373  | 56,293    | 52,996    |
| Nebraska             | 95,895  | 96,805    | 105,435   |
| Nevada               | 100,823   | 126,342   | 132,783   |
| New Hampshire        | 39,934  | 37,222    | 43,803    |
| New Jersey           | 313,905   | 306,000   | 311,643   |
| New Mexico           | 171,486   | 180,314   | 189,885   |
| New York             | 1,302,548   | 1,326,899 | 1,289,941 |
| North Carolina       | 565,592   | 690,249   | 707,397   |
| North Dakota         | 35,721  | 34,483    | 35,287    |
| Ohio                 | 628,661   | 654,065   | 646,884   |
| Oklahoma             | 278,817   | 264,021   | 266,173   |
| Oregon               | 193,307   | 225,162   | 221,346   |
| Pennsylvania         | 629,331   | 586,709   | 607,380   |
| Rhode Island         | 39,151  | 49,801    | 50,197    |
| South Carolina       | 331,980   | 306,395   | 343,411   |
| South Dakota         | 51,827  | 51,608    | 45,555    |
| Tennessee            | 420,995   | 362,723   | 457,239   |
| Texas                | 2,152,882   | 2,258,865 | 2,403,421 |
| Utah                 | 125,314   | 122,830   | 128,954   |
| Vermont              | 27,910  | 25,309    | 34,273    |
| Virginia             | 375,921   | 389,069   | 419,894   |
| Washington           | 305,166   | 277,388   | 304,320   |
| West Virginia        | 120,733   | 104,879   | 113,094   |
| Wisconsin            | 261,374   | 289,127   | 321,693   |
| Wyoming              | 24,794  | 22,114    | 21,546    |

Table A.18. Standard Errors of Final Shrinkage Estimates of Number of People Eligible for SNAP

|                      | Standard Errors of Estimates of Number of People Eligible for SNAP |         |         |
|----------------------|--|---------|---------|
|                      | 2006   | 2007    | 2008    |
| Alabama              | 30,159   | 29,963  | 30,229  |
| Alaska               | 3,713  | 3,467   | 3,985   |
| Arizona              | 29,152   | 31,458  | 31,215  |
| Arkansas             | 15,453   | 16,154  | 17,347  |
| California           | 123,958  | 120,824 | 123,492 |
| Colorado             | 23,990   | 22,750  | 24,107  |
| Connecticut          | 10,122   | 10,998  | 11,168  |
| Delaware             | 3,337  | 3,640   | 4,356   |
| District of Columbia | 6,438  | 5,686   | 5,887   |
| Florida              | 73,466   | 80,412  | 83,623  |
| Georgia              | 47,483   | 53,963  | 54,724  |
| Hawaii               | 5,589  | 5,567   | 5,178   |
| Idaho                | 8,162  | 8,468   | 8,223   |
| Illinois             | 42,014   | 43,062  | 45,348  |
| Indiana              | 25,034   | 24,406  | 26,501  |
| Iowa                 | 11,912   | 11,489  | 11,689  |
| Kansas               | 12,688   | 12,034  | 13,465  |
| Kentucky             | 25,343   | 23,533  | 23,230  |
| Louisiana            | 26,508   | 26,267  | 29,033  |
| Maine                | 6,091  | 5,638   | 5,300   |
| Maryland             | 20,077   | 23,525  | 23,958  |
| Massachusetts        | 26,300   | 28,307  | 27,647  |
| Michigan             | 43,850   | 44,508  | 48,980  |
| Minnesota            | 16,596   | 17,485  | 19,469  |
| Mississippi          | 33,296   | 30,436  | 28,132  |
| Missouri             | 19,347   | 22,180  | 22,501  |
| Montana              | 6,334  | 5,757   | 5,582   |
| Nebraska             | 7,881  | 7,764   | 7,750   |
| Nevada               | 12,928   | 13,500  | 15,333  |
| New Hampshire        | 3,750  | 4,291   | 4,209   |
| New Jersey           | 27,374   | 31,531  | 33,470  |
| New Mexico           | 11,296   | 12,707  | 13,534  |
| New York             | 84,601   | 89,314  | 84,635  |
| North Carolina       | 38,439   | 39,945  | 40,680  |
| North Dakota         | 3,465  | 3,028   | 2,884   |
| Ohio                 | 43,596   | 44,101  | 44,216  |
| Oklahoma             | 18,046   | 18,944  | 20,241  |
| Oregon               | 15,532   | 15,299  | 15,311  |
| Pennsylvania         | 52,580   | 54,038  | 51,666  |
| Rhode Island         | 5,428  | 5,213   | 4,944   |
| South Carolina       | 22,447   | 21,429  | 22,948  |
| South Dakota         | 5,386  | 4,846   | 4,878   |
| Tennessee            | 34,015   | 32,836  | 32,206  |
| Texas                | 99,926   | 121,915 | 123,880 |
| Utah                 | 9,326  | 9,880   | 11,394  |
| Vermont              | 2,337  | 2,386   | 2,245   |
| Virginia             | 30,871   | 33,659  | 33,607  |
| Washington           | 22,850   | 22,927  | 24,372  |
| West Virginia        | 13,328   | 12,619  | 11,131  |
| Wisconsin            | 19,399   | 19,120  | 19,698  |
| Wyoming              | 4,080  | 3,432   | 3,563   |

Table A.19. Standard Errors of Final Shrinkage Estimates of Number of Working Poor Eligible for SNAP

|                      | Standard Errors of Estimates of Number of Working Poor Eligible for SNAP |         |         |
|----------------------|--|---------|---------|
|                      | 2006   | 2007    | 2008    |
| Alabama              | 21,214   | 22,665  | 22,606  |
| Alaska               | 3,040  | 3,687   | 3,395   |
| Arizona              | 28,425   | 26,810  | 30,983  |
| Arkansas             | 12,369   | 14,109  | 14,683  |
| California           | 167,495  | 169,530 | 186,109 |
| Colorado             | 18,124   | 21,506  | 23,882  |
| Connecticut          | 8,334  | 9,094   | 9,489   |
| Delaware             | 2,924  | 3,519   | 3,791   |
| District of Columbia | 5,919  | 6,039   | 4,872   |
| Florida              | 66,420   | 70,687  | 72,865  |
| Georgia              | 49,405   | 57,597  | 58,341  |
| Hawaii               | 5,547  | 6,307   | 5,973   |
| Idaho                | 7,390  | 7,039   | 7,664   |
| Illinois             | 38,175   | 37,900  | 41,293  |
| Indiana              | 18,285   | 20,553  | 18,571  |
| Iowa                 | 9,413  | 10,238  | 9,329   |
| Kansas               | 11,826   | 10,800  | 12,104  |
| Kentucky             | 19,911   | 16,670  | 13,845  |
| Louisiana            | 22,128   | 25,316  | 23,941  |
| Maine                | 5,052  | 4,094   | 4,340   |
| Maryland             | 20,848   | 24,682  | 21,871  |
| Massachusetts        | 20,393   | 17,365  | 23,432  |
| Michigan             | 32,442   | 38,937  | 39,795  |
| Minnesota            | 12,276   | 14,817  | 18,598  |
| Mississippi          | 23,563   | 27,026  | 21,230  |
| Missouri             | 17,873   | 18,774  | 21,826  |
| Montana              | 4,923  | 4,401   | 4,281   |
| Nebraska             | 6,614  | 6,330   | 6,919   |
| Nevada               | 9,791  | 12,935  | 13,600  |
| New Hampshire        | 3,419  | 3,073   | 3,751   |
| New Jersey           | 26,387   | 25,803  | 27,615  |
| New Mexico           | 10,155   | 12,473  | 12,480  |
| New York             | 105,174  | 101,428 | 100,844 |
| North Carolina       | 31,258   | 37,177  | 39,014  |
| North Dakota         | 3,344  | 2,660   | 2,697   |
| Ohio                 | 32,869   | 34,312  | 33,210  |
| Oklahoma             | 15,681   | 15,554  | 15,610  |
| Oregon               | 13,344   | 15,790  | 15,208  |
| Pennsylvania         | 40,218   | 36,137  | 37,824  |
| Rhode Island         | 4,160  | 4,670   | 4,342   |
| South Carolina       | 20,684   | 18,562  | 20,787  |
| South Dakota         | 4,311  | 4,021   | 3,227   |
| Tennessee            | 28,188   | 22,513  | 27,566  |
| Texas                | 103,541  | 122,236 | 125,377 |
| Utah                 | 8,589  | 8,424   | 10,577  |
| Vermont              | 2,298  | 1,850   | 2,558   |
| Virginia             | 31,090   | 31,176  | 33,363  |
| Washington           | 20,987   | 19,551  | 21,604  |
| West Virginia        | 9,432  | 7,464   | 8,182   |
| Wisconsin            | 16,865   | 18,001  | 19,775  |
| Wyoming              | 3,136  | 2,419   | 2,341   |

Table A.20. Number of People Receiving SNAP Benefits under Normal Eligibility Rules, Adjusted for Payment Error, Monthly Average

|                      | Payment Error-Adjusted Number of People Receiving SNAP Benefits under Normal Rules |           |           |
|----------------------|--|-----------|-----------|
|                      | 2006   | 2007      | 2008      |
| Alabama              | 531,801  | 535,784   | 564,458   |
| Alaska               | 54,730   | 54,732    | 54,542    |
| Arizona              | 519,719  | 531,436   | 590,929   |
| Arkansas             | 369,420  | 369,803   | 369,706   |
| California           | 1,977,260  | 2,019,510 | 2,195,870 |
| Colorado             | 245,158  | 245,457   | 249,806   |
| Connecticut          | 203,685  | 203,341   | 215,761   |
| Delaware             | 59,431   | 60,498    | 67,031    |
| District of Columbia | 85,374   | 83,219    | 86,066    |
| Florida              | 1,183,286  | 1,208,295 | 1,449,341 |
| Georgia              | 910,256  | 909,804   | 1,008,166 |
| Hawaii               | 87,134   | 88,318    | 95,198    |
| Idaho                | 89,079   | 85,126    | 98,413    |
| Illinois             | 1,198,325  | 1,227,579 | 1,282,798 |
| Indiana              | 560,961  | 567,457   | 605,406   |
| Iowa                 | 219,548  | 230,789   | 244,872   |
| Kansas               | 177,291  | 180,359   | 182,079   |
| Kentucky             | 575,052  | 591,071   | 618,542   |
| Louisiana            | 624,953  | 628,564   | 643,264   |
| Maine                | 149,413  | 146,368   | 158,163   |
| Maryland             | 287,481  | 295,244   | 337,486   |
| Massachusetts        | 412,613  | 429,286   | 476,588   |
| Michigan             | 1,032,046  | 1,127,074 | 1,154,431 |
| Minnesota            | 255,113  | 267,856   | 284,104   |
| Mississippi          | 404,389  | 421,126   | 443,988   |
| Missouri             | 560,967  | 662,313   | 687,972   |
| Montana              | 78,018   | 77,497    | 78,840    |
| Nebraska             | 117,709  | 119,317   | 119,969   |
| Nevada               | 116,187  | 120,151   | 141,686   |
| New Hampshire        | 55,096   | 56,816    | 61,819    |
| New Jersey           | 397,002  | 407,900   | 427,881   |
| New Mexico           | 238,225  | 228,325   | 235,016   |
| New York             | 1,752,660  | 1,764,611 | 1,902,135 |
| North Carolina       | 841,992  | 876,289   | 939,781   |
| North Dakota         | 40,020   | 42,529    | 45,112    |
| Ohio                 | 1,027,566  | 1,038,399 | 1,138,233 |
| Oklahoma             | 421,661  | 407,168   | 406,965   |
| Oregon               | 386,386  | 402,861   | 420,386   |
| Pennsylvania         | 1,069,491  | 1,114,010 | 1,173,319 |
| Rhode Island         | 71,727   | 75,044    | 83,381    |
| South Carolina       | 520,979  | 533,935   | 577,113   |
| South Dakota         | 57,859   | 59,442    | 62,637    |
| Tennessee            | 841,072  | 844,943   | 889,164   |
| Texas                | 2,422,580  | 2,290,891 | 2,408,295 |
| Utah                 | 128,703  | 121,189   | 130,430   |
| Vermont              | 44,825   | 47,017    | 52,469    |
| Virginia             | 491,624  | 501,832   | 533,033   |
| Washington           | 524,967  | 523,912   | 564,045   |
| West Virginia        | 256,713  | 260,853   | 269,218   |
| Wisconsin            | 331,888  | 353,974   | 380,335   |
| Wyoming              | 23,819   | 21,697    | 22,324    |

Table A.21. Number of Working Poor Receiving SNAP Benefits under Normal Eligibility Rules, Adjusted for Payment Error, Monthly Average

|                      | Payment Error-Adjusted Number of Working Poor Receiving SNAP Benefits under Normal Rules |           |           |
|----------------------|--|-----------|-----------|
|                      | 2006   | 2007      | 2008      |
| Alabama              | 199,414  | 217,104   | 218,919   |
| Alaska               | 25,038   | 24,104    | 25,945    |
| Arizona              | 262,463  | 239,886   | 278,738   |
| Arkansas             | 160,525  | 162,742   | 158,175   |
| California           | 784,625  | 822,674   | 815,323   |
| Colorado             | 87,698   | 102,252   | 101,752   |
| Connecticut          | 58,086   | 61,613    | 64,212    |
| Delaware             | 27,033   | 24,294    | 30,545    |
| District of Columbia | 12,779   | 12,212    | 11,275    |
| Florida              | 441,803  | 450,700   | 475,194   |
| Georgia              | 412,290  | 428,686   | 455,272   |
| Hawaii               | 36,171   | 38,511    | 39,420    |
| Idaho                | 45,773   | 45,500    | 52,709    |
| Illinois             | 461,529  | 456,756   | 499,101   |
| Indiana              | 241,660  | 250,381   | 240,004   |
| Iowa                 | 103,044  | 118,936   | 114,230   |
| Kansas               | 83,365   | 84,699    | 86,606    |
| Kentucky             | 213,225  | 213,989   | 176,680   |
| Louisiana            | 266,335  | 279,296   | 269,104   |
| Maine                | 56,715   | 55,628    | 57,430    |
| Maryland             | 101,300  | 105,413   | 110,879   |
| Massachusetts        | 91,887   | 88,857    | 117,994   |
| Michigan             | 443,030  | 492,302   | 516,696   |
| Minnesota            | 82,366   | 100,192   | 110,872   |
| Mississippi          | 164,810  | 183,481   | 177,397   |
| Missouri             | 249,736  | 267,579   | 303,356   |
| Montana              | 35,818   | 36,184    | 33,136    |
| Nebraska             | 51,557   | 56,524    | 59,814    |
| Nevada               | 46,617   | 47,073    | 54,227    |
| New Hampshire        | 19,506   | 19,629    | 21,862    |
| New Jersey           | 135,720  | 135,725   | 128,556   |
| New Mexico           | 121,372  | 115,247   | 120,649   |
| New York             | 605,336  | 643,651   | 620,914   |
| North Carolina       | 319,668  | 396,699   | 405,723   |
| North Dakota         | 18,128   | 20,382    | 21,984    |
| Ohio                 | 411,343  | 400,265   | 415,957   |
| Oklahoma             | 181,694  | 167,085   | 161,804   |
| Oregon               | 149,378  | 179,267   | 171,764   |
| Pennsylvania         | 388,672  | 393,442   | 391,803   |
| Rhode Island         | 13,772   | 20,026    | 19,992    |
| South Carolina       | 219,312  | 193,824   | 228,215   |
| South Dakota         | 29,137   | 29,781    | 28,050    |
| Tennessee            | 303,995  | 270,825   | 334,922   |
| Texas                | 1,170,552  | 1,057,314 | 1,120,480 |
| Utah                 | 61,804   | 60,983    | 62,136    |
| Vermont              | 16,378   | 16,583    | 22,309    |
| Virginia             | 189,236  | 202,222   | 215,819   |
| Washington           | 202,863  | 174,110   | 197,596   |
| West Virginia        | 96,497   | 99,880    | 102,682   |
| Wisconsin            | 149,787  | 172,346   | 192,478   |
| Wyoming              | 11,643   | 10,324    | 10,788    |

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